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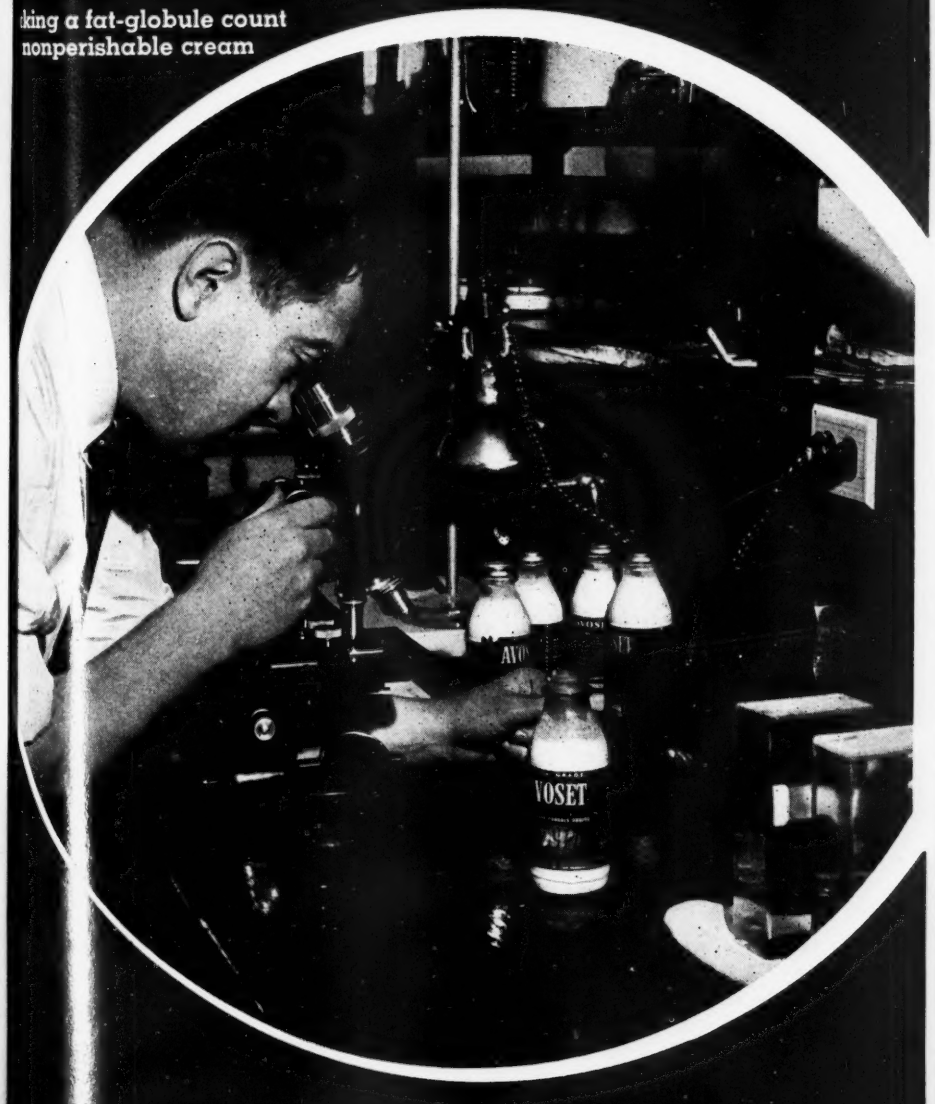
FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



king a fat-globule count
nonperishable cream

AUGUST 1945

Nonperishable Cream By New Technics

Starch Sponge —A New Ingredient

Take the Oxygen Out of Containers

Carbon Dioxide in The Food Industries

Matching Production And Steam Supply

Improves Personnel By On-Job Training

Food Ships Will Aid Postwar Export

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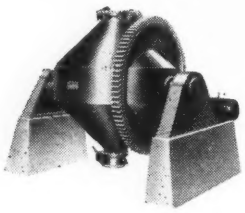

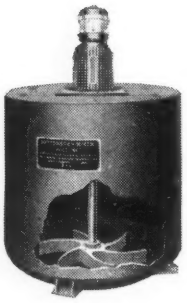

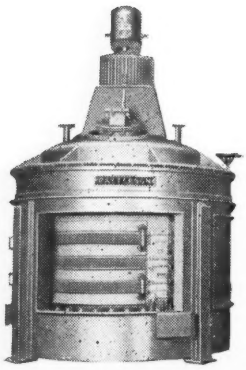

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THE COVER

Rigorous quality control is one of the secrets of California Milk Products Co.'s success in making a nonperishable cream, Avoset. This cream may be kept at room temperature for a year or longer. Frank T. Donaldson, director of research and control laboratories, is shown making a fat-globule count in the picture on the cover. For complete details, see page 69. (*Photo courtesy Westinghouse*)

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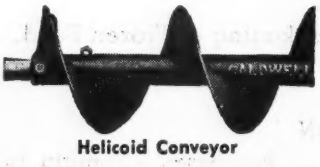

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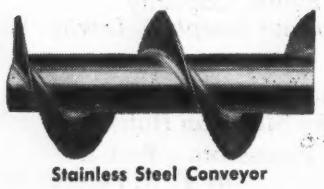

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Typical Link-Belt Screw Conveyor, with part of cover removed to show flighting.

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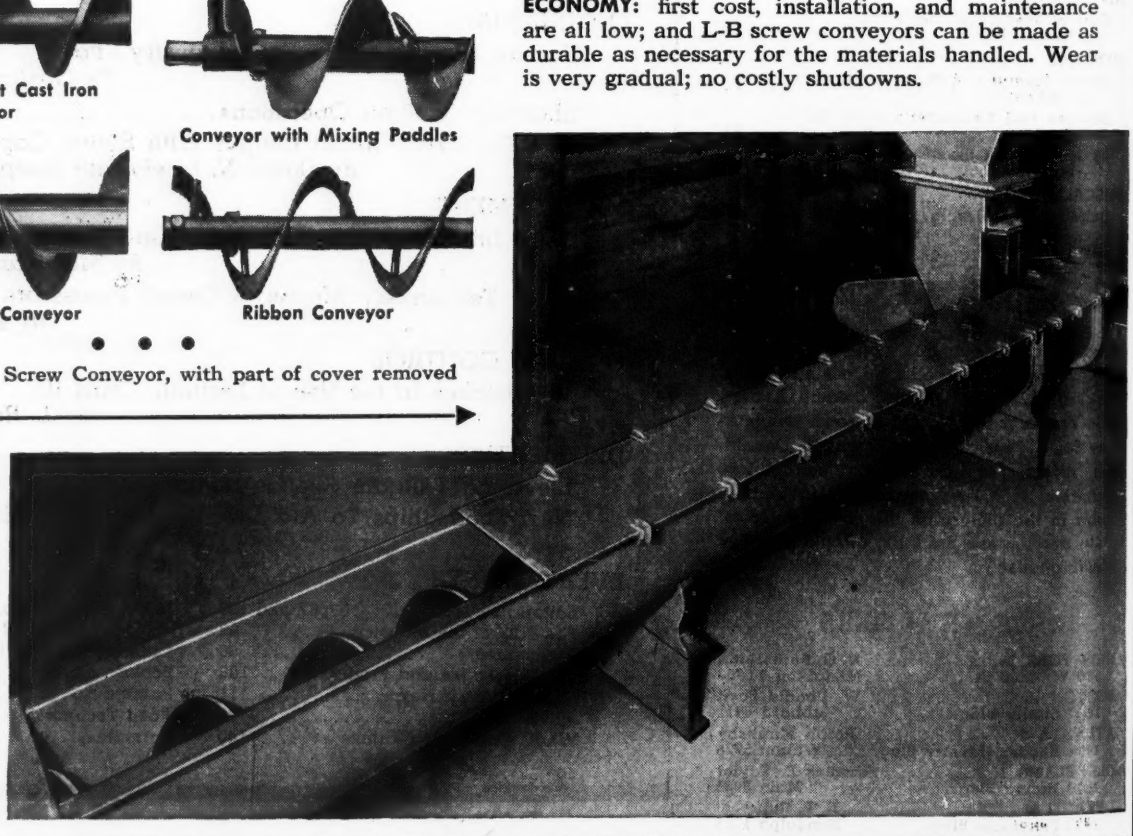

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At Last—A Realistic Food Policy

SORRY! I can't tell you all about my recent mission overseas. My orders from the U. S. Army were stamped SECRET. Everything is still under official wraps. But it is possible to tell how things look after coming home.

It takes an absence from the country to bring events into proper perspective. Last year when I returned from New Guinea after a half-year below the equator, a prominent food manufacturer fairly guffawed when I spoke of the rapidly developing food shortage. Said he: "Get this straight. There is no food shortage! Our warehouses are full. I'd like to make some sales. Where do you get that shortage stuff?"

Six months later, in England, the most frequent $64 question was: "Is America going to let us down on food?"

At home again, 18 lb. lighter after less than three months overseas, I find the food crisis is full grown and is now front-page news. Writing at this time it is difficult to avoid the "I-told-you-so" attitude. Yet, the only real interest I hold in having been right in the past is reported every month by my bank—a strictly private matter. There is no point in proving to any one else that, way back in the spring of 1939, this publication was somewhat aware of what was coming. Nor in revealing how much pressure was put on me in 1940 to suppress some of my findings about the then well-nigh hopeless outlook for preservation of adequate quantities of perishable foods. Nor in identifying prominent persons whose Pollyanna-ish attitude in 1940-41-42-43 has done much to bring about the situation that exists in our food supply in 1945. Nor to name the Cabinet officer with whom I discussed the future of our food supply on Dec. 29, 1941, who agreed that something must be done at once, only to be immediately dissuaded by his youthful public relations man who could speak so impressively.

While we cannot forget, nor ignore past errors, there is little profit in recapitulation.

YOU HAVE no idea how refreshing and gratifying it is to return home from abroad to discover that a man like Clinton P. Anderson is now in charge of most of the food situation. Actually, he has gone out all around the country to study the problems. Think of that! He went out to people who knew. He asked questions, invited comment. And he and his committee listened. Remarkable! And there is no record of any member of the Congressional Committee snarling to a complainer: "Have you heard of anyone going hungry?"

The House Food Committee reports on sugar and meat are damning documents. Their revelation of administration ineptitude and incompetence in high places is shocking. It is surprising that so few officials have since been removed.

Let us be thankful that Secretary Anderson is a man of salty common sense. He has no more of the superiority complex than President Truman. Neither has the "Papa-knows-best" attitude.

At last, the first team is being used in what has long been a losing game.

SECRETARY ANDERSON faces a very badly deteriorated food situation, one that extends far beyond the borders of the United States of America. I cannot forget that American forces in Great Britain received a 10 percent cut in rations on May 1. (That is one reason why I lost so much weight.) I cannot forget the consternation in Britain when it was announced that no more meat would be sent to them from the United States until autumn. Nor can I forget the reduction of the British ration of bacon on May 27 from 4 to 3 oz. a week—a 25 percent drop; nor the 50 percent cut in cooking fats from 2 oz. a week to 1 oz. These are merely symptomatic—not the total reductions over there.

The new Secretary of Agriculture cannot control the weather, and our crops are far from assured for 1945. He can't turn back the clock and undo the mistakes of others. He can't bring about the production of foods in years gone by. But he can be expected to use the same common sense he showed as chairman of the Special Committee of the House of Representatives to Investigate Food Shortages.

And he can be expected to exhibit the same courage in dealing with bad news that he has shown to date. Apparently, he has no economic philosophy other than that of plenty, supplemented by adequate safeguards for the farmer.

If he ascertains the facts and evaluates them correctly as he has done in the past, he will know what to do with an appallingly bad food situation that affects, not only us, but every nation we are pledged to help.

L. V. Burton EDITOR

The Talk of the Industry

• IT looks as if Elliott Roosevelt has gotten into the chain store business in a fairly big way.

• WITH the black market for refined sucrose at a reported price of 25 cents a pound, the situation is strangely reminiscent of the sugar market in 1919-1920. Remember the times?

• MANY persons have responded for themselves or for others to our notice requesting the address of food technologists in the ETO (European Theater of Operations). To all who aided the quest we extend appropriate thanks. But the curious feature was the large number of names of men who were not in ETO. One list of about 30 such names held only five that were in Europe. There were also names from the far side of the Pacific Ocean. Apparently ETO covers the earth!

• THE meek shall inherit the earth" has always been a puzzler to this department. Possibly it means that if the aggressive nations kill each other off, there will remain only the meek ones to take over. Sounds like a good reason to make the United Nations a success.

• COLONEL WASHINGTON PLATT, General Staff Corps, resplendent with three rows of ribbons and combat citations galore, is the most decorated food technologist of our acquaintance. He hails from the Borden Co., Syracuse, N. Y., but when we saw him in London he was Chief Intelligence Officer of XIX Army Corps.

• THE meaning of *time in process* or *goods in process* apparently varies from industry to industry. The absurd and wholly illogical concept of processed foods that has been utilized by OPA is but one manifestation of the divergent meanings. It has come up again in a recent conversation with a cheese manufacturer who was asked how long his special cheeses were in process. To this query he replied, with unmistakeable signs of annoyance:

"Our cheese is a natural cheese. It is not processed in any way."

When it was explained the question referred to the length of time the cheese was undergoing the manufacturing process, he replied in identical words.

Which leaves us almost speechless.

• REPRESENTATIVE DOUGHTON'S Bill to give $25 a week unemployment compensation looks like a device to force a $25 weekly minimum wage.

• COFFEE and cigarette quality seem to be suffering unduly these days. From the strictly lay, though critical, consumer viewpoint, all brands of coffee taste pretty much alike. It is as difficult to distinguish between them as it is to find any differences between cigarettes.

Inquiry as to the source of the coffee dissatisfaction reveals that OPA ceilings are to blame. Production costs in Latin America have been increasing over a long period of time, but OPA refuses to permit higher prices here. Consequently, our coffee-producing friends have been forced to economize. One tale has it that we are now receiving the lower grades of coffee that normally would have been destroyed in prewar years.

But, plausible though it sounds, it also recalls the old question of who gets all the beef steaks. There must be a lot of good coffee somewhere.

• BUTTER manufacturers recently released figures showing that butter averages as high as 15,000 International Units per pound of vitamin A.

The margarine makers promptly upped their added A to the top figure for butter, Best Foods Corp. being one of the first to act.

Who is ahead now?

• SPEAKING of wise market tactics, the current retail price of refined dextrose is now about 19 cents in chain stores *vs.* sucrose at 5 lb. for 39 cents plus ration coupons. As long as dextrose sells for the higher price, there can be no protest about underselling.

• AFTER reading the published version of the United Nations Charter, it appears as if this organization is one in which there are to be no dues. Wonder how they expect to pay the help?

Hors d'Oeuvres

• The Full Employment Bill introduced in Congress would abolish unemployment by statute. Too bad Hoover didn't think to legislate those two chickens into every pot.

• *Better than a billion bushels of wheat will grow this season, crop estimates indicate. But without shortening and sugar, wheat is just so much pig feed.*

• "Good food served palatable and hot is so closely linked with high morale that, for strategic reasons alone, ranking officials should consider feeding one of the most important of their responsibilities." So reports a special committee after studying the Navy's food administration. That we toss out just to bolster your professional pride.

• *A Portland grocery boasts: "As few potatoes as any store in the city. The shortage of margarine is abundant. In our meat department we have an excellent array of pictures. Sugar? Silly people. Poultry? Ditto."—'Taint funny, McGee.*

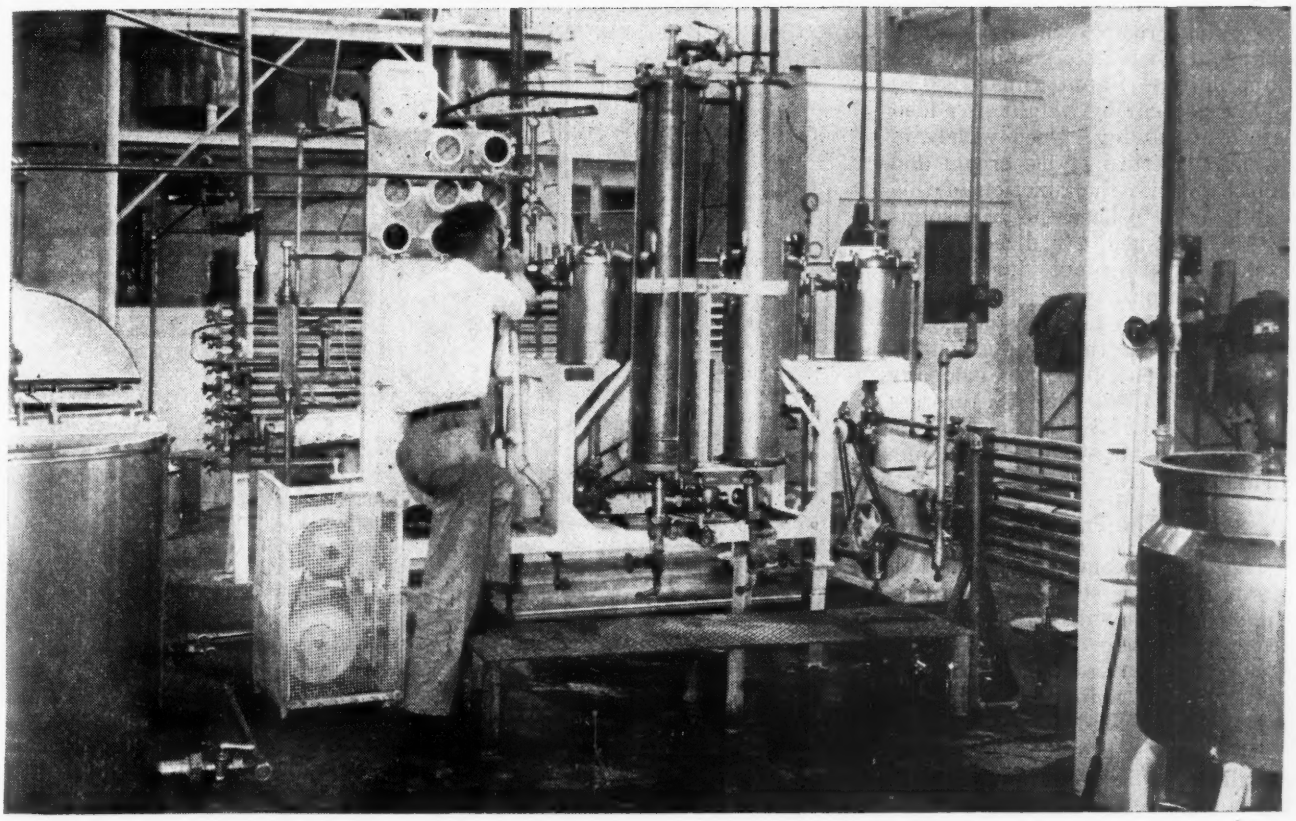
• A staff writer for "Yank," inspired by recent developments in frozen cooked foods, believes that the next big step forward will be a quick frozen meal which can be eaten plate and all—the plate being the dessert. Well, brides have long been turning out pie crusts that would pass as plates.

• *Civilians will get* 7,000,000 *lb. more butter in the third quarter than in the second. Sounds wonderful until you divide it by* 130,000,000, *then you can eat it on one serving of toast.*

• Rattlesnakes again will be canned —this time by Ross Allen, who bought the business of the late George K. End, victim of snakebite. Mr. Allen is one food executive we don't envy.

• *It takes* 2,000,000 *million acres of corn to feed the corn ear worm each year. And there's no reverse Lend-Lease with him.*

• People used to worry about what they ate. Now it's what they don't eat that bothers them. F.K.L.



In the processing room an operator checks steam temperature and pressure of the Avoset sterilizing equipment.

New Technics and Controls Produce Nonperishable Cream

Product is stabilized, sterilized at high temperature, homogenized and bottled under sterile conditions. Germicidal lamps and electrostatic air cleaner prevent contamination. Here is quality control worth noting

By C. R. HAVIGHORST, Assistant Editor of "Food Industries," San Francisco.

FIRST developed and described by George Grindrod in a series of patents (1939), a method of processing a sterilized and stabilized cream has been perfected during the past six years by California Milk Products Co. While Avoset (the trade-name of the product) has been successfully produced since 1941, distribution has been limited because of the modest production volume. Today, with the entire output of the one plant going to the armed forces, there is little or none available for civilian consumption. As a consequence, this product is not as widely known today as it promises to be postwar.

Sterility of the product is attained without the development of chemical changes which produce caramelization and instability. The process employs high-temperature continuous sterilization in which the product is brought to sterilizing temperature almost instantly and then rapidly cooled after a short interval of time. In fact, the product evidences unusual stability qualities with almost complete absence of the cooked flavor or partially caramelized color often associated with heat-processed fluid milk products.

Under wartime restrictions, production is limited mainly to table grade cream of 18 percent butterfat. Previously, a table grade of 20 percent and a whipping grade of 30 percent butterfat were produced in about equal volumes.

As in other processes, the selection of the raw material is of first-rate importance. Careful tests are made of the fresh cream to select a product having an acidity of below 0.15 percent for the light grades and below 0.14 percent for the heavy grades.

Cream selected for processing is piped to a storage tank in the

processing room, where a small amount of vegetable stabilizer (sodium alginate), approximately 0.10 to 0.25 percent by weight, is added before processing. Used widely in the manufacture of ice cream and ice cream mix, the function of this stabilizer is to keep the milk solids in the finished sterilized cream from separating out during long storage periods.

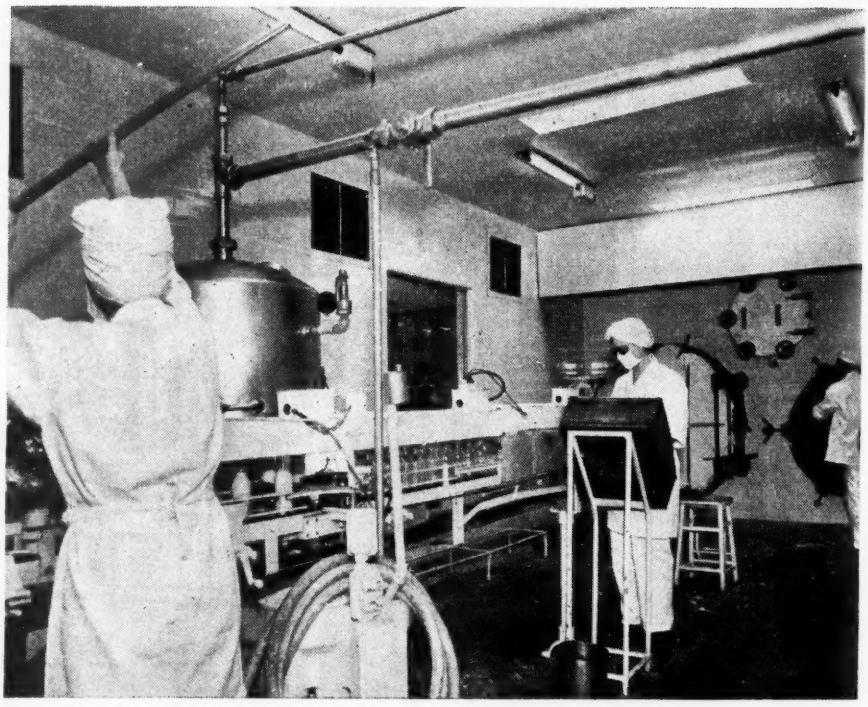
Although the process and equipment used in the production of Avoset are patented, the company is reluctant to disclose the process in detail. However, the process, in general, can be comprehended pictorially and from this text.

The Process

The fresh cream, with sodium alginate added, is sterilized in a continuous flow by direct application of high-pressure steam. This much is the Grindrod process. In the first units of the equipment the fresh cream is preheated, under pressure, in two kettles. It then flows to the sterilizers, where it is processed at 260 to 280 deg. F. Temperatures depend upon the capacity of the equipment and the time interval necessary to provide both a safe sterilizing time and a satisfactory stability. The sterilization time interval may vary, but it is seldom longer than 4 minutes.

The sterilized cream now flows to the homogenizer, where the pressure is kept below 2,000 lb. in the first stage and below 500 lb. in the second stage. Temperature of homogenization is not too critical, but should be above 150 deg. F. Pressures used are of more importance and must be carefully gaged to obtain a product that will not be too viscous.

From the homogenizer, the cream flows into cooling coils and thence into sterile holding tanks which feed the bottle filler.



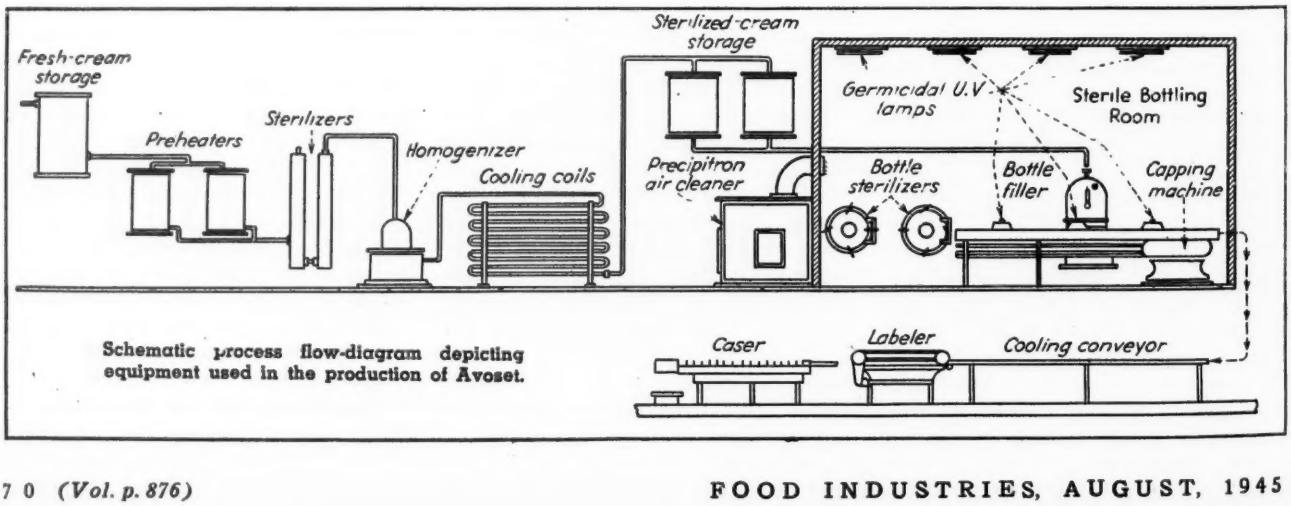
Electrically cleaned air and ultraviolet (Sterilamps) keep this bottling room virtually sterile. From a Precipitron, air flows into the room at the rate of 3,000 cu. ft. per minute. Operator at extreme right is removing sterile bottles from retort and operator second from right is placing bottles on covered conveyor equipped with ultraviolet lamps. Operator at the left is refilling cap magazine of White capping machine. Operators wear sanitary uniforms and breathing masks. Goggles protect eyes against ultraviolet.

The Avoset processing equipment is all of stainless steel construction and was built specifically for this purpose.

Bottling and Capping

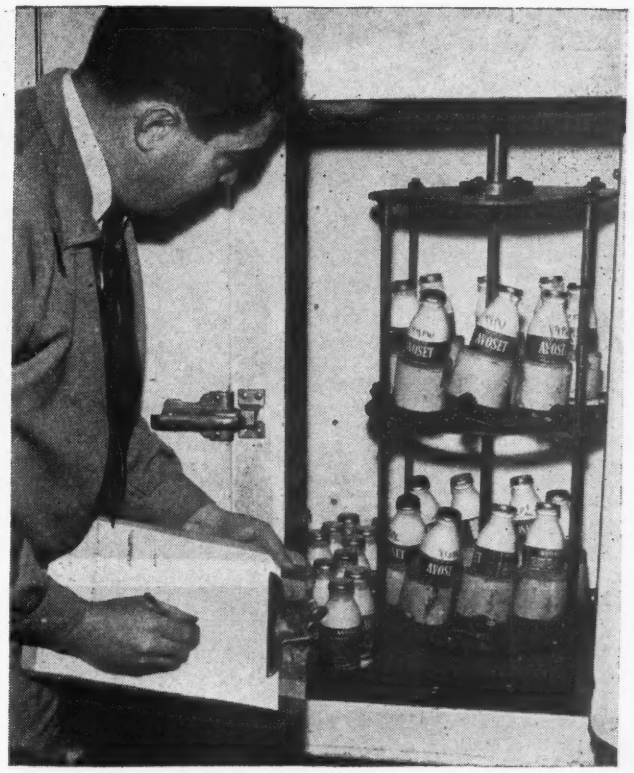
Among the most critical operations in the entire process is that of bottling and capping. In the bottling room, bacteria- and mold-killing radiations from ultraviolet lamps (Sterilamps by Westinghouse) guard against product contamination. Operators wear clean, sterilized white uniforms, gloves and masks and, at regular intervals, must pass careful physical examination for any indications of respiratory disorders. Caps (White Cap Co.) are first loaded into filling magazines, then placed with bottles in retorts in the bottling room, where both are sterilized in steam at 275 deg. F. The bottles are placed upon an endless conveyor, protected by a bank of germicidal lamps, which takes them through the Mojonnier filling machine and thence through the White Cap capping machine, which performs a sterile operation. Sterile conditions are further maintained by regular scrubbing and steaming of the entire room.

Air which enters the bottling room is scientifically cleaned and conditioned. Outside atmospheric air is drawn through a bank of



Schematic process flow-diagram depicting equipment used in the production of Avoset.

Bacteria-killing ultraviolet lamps stand guard on the ceiling of this change room, through which workers must pass before going on shift in the air conditioned bottling room.



On this rough-riding miniature "merry-go-round," bottles of Avoset stabilized cream must jiggle and bounce for five days while undergoing a simulated transportation test.

mechanical filters, water washers and a Westinghouse Precipitron. The latter removes particles of dirt as small as 1/250,000 in. by electrostatic action. The cleaned, washed air is brought to the desired temperature and humidity, then passed into the bottling room through a duct. Germicidal lamps in the duct provide a further precaution against bacterial contamination. After bottling and capping, the bottles travel over an air-cooled conveyor which removes most of the slight heat imparted to them by the capping machine, and then are labeled and cased.

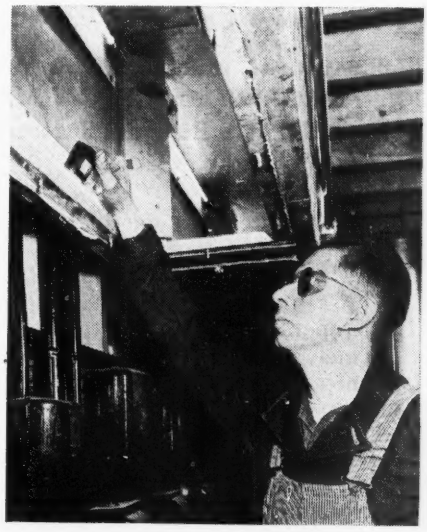
Quality-Control Tests

Each day's production is stored for six days while laboratory tests are made on sample bottles selected at random. Out of each lot some of the bottles are incubated at 100 deg. F. to speed up possible bacterial action, then are tested. Other bottles undergo a "transportation" examination. Placed in holders in the miniature "merry-go-round" the bottles are rolled over cams mounted on a circular track. This simulated churning action, which is not unlike that which the bottles would undergo in shipment, reveals any tendency of the cream to turn to butter, should it be either chemically or physically unstable. Laboratory tests also include a check on fat-globule content.

Present production capacity of the plant is approximately 600 cases of 36 half-pints per day. Since the product is completely sterile, the keeping period is limited only to the time required for physical and chemical changes to make it unacceptable. It has been found that undesirable flavor changes develop only very slowly. Samples over two years old are still satisfactory from a flavor standpoint. "Cream plug" formation sometimes takes place in nine months to a year, depending upon storage conditions. Lower temperatures delay this, and it can be prevented entirely by occasionally inverting the cases.

The 30 percent butterfat grade, which is most susceptible to churning, is shipped in refrigerated cars, but ordinary care is used for the table grades. Under normal transportation conditions, the stabilized cream may be shipped long distances with no churning trouble.

Removing foreign particles from plates of electrostatic air cleaner, an operation performed weekly, after hours.



Testing Sterilamps in the air duct leading to the bottling room. These lamps are inspected and tested three times weekly.

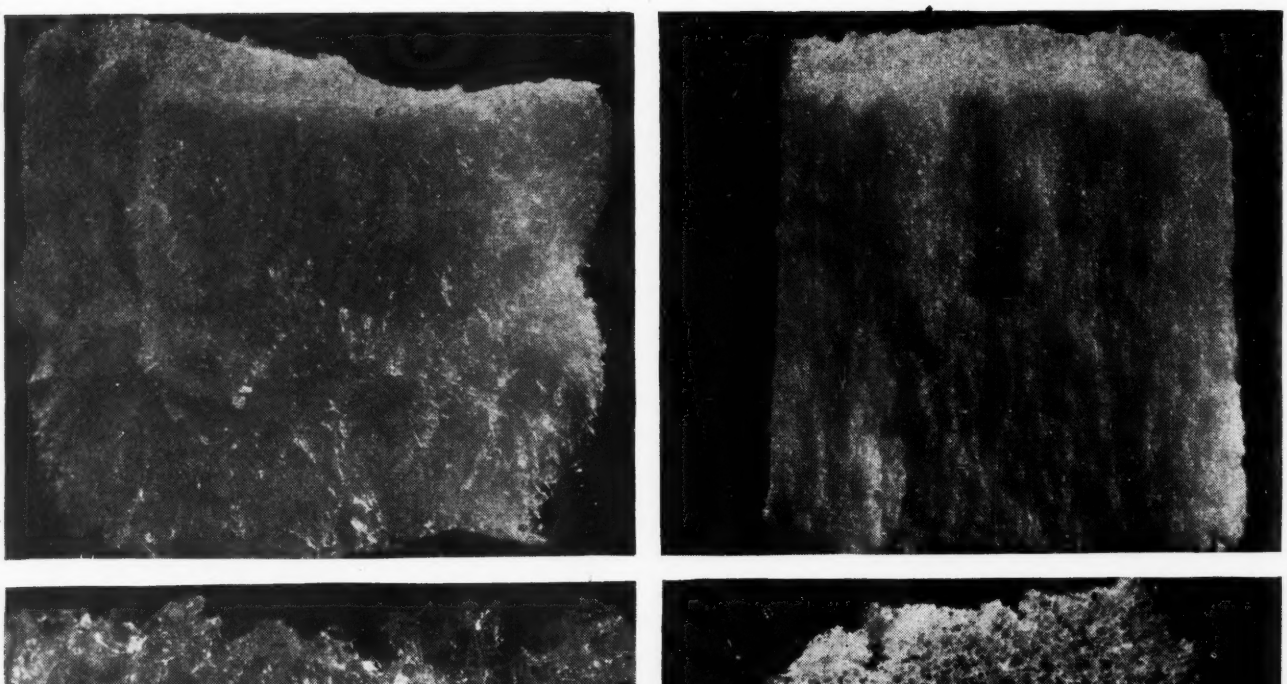


Fig. 1. Upper left, coarse-textured starch sponge showing gross appearance; lower left, cross section of product magnified about 7½ times. Right, similar views of a fine-textured sponge.

STARCH SPONGE —A Promising New Ingredient

By G. E. HILBERT, M. M. MacMASTERS, MARY J. COX, C. W. BICE, MARGARET HEDGES, VELMA L. GETZ,
Starch and Dextrose Division, Northern Regional Research Laboratory,* Peoria, Ill.

POTENTIAL commercial use in foods of a heretofore little-known starch-conversion product has been demonstrated at the Northern Regional Research Laboratory. Technically, this product is known as "starch sponge."

It can be used in foods for several purposes. In its dry state it has a crispness that will impart crunchiness to candies and cracker-like wafers. When shredded, the dry sponge may be used like shredded coconut or shredded nutmeats. Whether ground or shredded, it can be incorporated into chocolate candy coatings or candy bars to improve their texture and their ability to withstand extreme variations in temperature.

Finely ground, the sponge shows promise as a stabilizer in confectionery coatings and icings. It can be used as a carrier for flavoring extracts and in chocolate, soya or wheat flours, vitamin preparations and fruit, vegetable or meat concentrates. These ingredient materials are added to the starch paste before it is converted to the sponge state by freezing and drying. The resulting sponges can be used as such or can be further treated after drying, as by coating with chocolate. Squares of dried chocolate sponge coated in dipping chocolate make an unusual and pleasing confection. (Fig. 2.)

A new type of confection has been made by impregnating starch sponge with sweet chocolate. (Fig. 3.) This chocolate confection is

*One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

Its interesting properties indicate practical uses in bakery products, confections and specialty foods. Discovered over 100 years ago, its value in foods has only recently been demonstrated in research studies

crunchy, disintegrates rapidly in the mouth without becoming gummy and does not have the cloying sweetness of the chocolate alone. Unlike the use of ground puffed cereals, bran and the like, which are at times added to candies to give them crunchiness, use of starch sponge does not involve the likely irritating action on sensitive intestinal tracts because the sponge is easily digested in the human alimentary system.

Compressed sponge is a concentrated carbohydrate and, as such, has obvious possibilities in emergency rations and sportsmen's packs. By the addition of vitamin concentrates, proteins and other food constituents to the sponge, its nutritive value can be enhanced with little or no increase in bulk. Another specific characteristic is its blandness. This makes the sponge suitable for consumption under starvation conditions over extended periods of time, such as during confinement on life rafts when a highly or distinctively flavored food would become distasteful, if not actually unpalatable. Other advantages of the sponge, under such restricted diet or ration conditions, are the rapidity with which the sponge disintegrates in the mouth and its minimum requirements upon the human body for water to favor its metabolism or digestional combustion.

Starch sponge is readily prepared by cooling a cooked 5 percent paste of commercial corn, wheat or potato starch to temperatures of from –2.0 to –16.0 deg. C. When the frozen mass is thawed and pressed, the product readily loses most of the free water of the paste. (Fig. 4.) Freezing the paste so completely insolubilizes the starch that practically no soluble starch is present in the expressed water.

After it has been freed from the excess water and the pressure released, the sponge readily expands to assume the form of the mold in which it was originally cast. For that reason, no difficulty is experienced in preparing a sponge in any shape, form or dimension desired.

Freezing starch gels at temperatures just below 0 deg. C. favors the formation of coarse sponges, while finely porous sponges are formed by freezing at –10 to –16 deg. C. (Fig. 1). The size of the pores in the sponge can be further modified by beating quantities of air into the paste. A sponge from which the major portion of the water has been removed mechanically has a slightly rough exterior (Fig. 4), is soft but pliable and free from slimeness, and can be torn apart easily. In this condition, it still contains about 60 percent of moisture (commercial white bread has a moisture content of only about 36 percent).[1] When oven-dried to a crisp and brittle consistency, the sponge contains about 2 percent of moisture. In comparison, soda crackers have a moisture content of as much as 5.7 percent.[1]

Dry starch sponge has a number of interesting properties. It is predominantly white, porous, crisp, brittle and quite strong. It is also light, with a density of about 0.14 g. per cubic centimeter. When very dry, it is crunchy, practically flavorless and does not become stale on standing as long as six months. However, it is hygroscopic and will become tough if exposed to atmospheric humidity. When immersed in water, 70 percent alcohol or various vegetable or fruit juices, the dry sponge immediately becomes soft and absorbs about 16 times its weight of liquid, increasing in volume as much as 100 percent. In boiling water, the sponge falls apart into soft shreds. When placed in lipophilic liquids such as benzene, ether, absolute alcohol or hexane, the sponge absorbs the liquid but remains brittle. Although the sponge is in an insoluble state, it is rapidly attacked by amylases, disintegrates quickly on ingestion and is completely assimilated by the body.

When dried, starch sponge is surprisingly similar in texture to some baked products. The starch is in strands or films surrounding relatively large air spaces (Fig. 1). While baked goods become spongy because of gas formation and increase in volume as the gas bubbles expand in the dough containing wheat flour, frozen starch paste owes its spongy character to dehy-

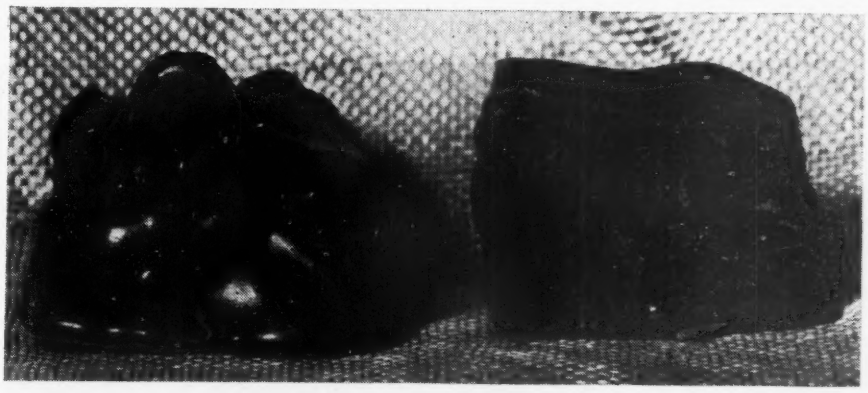


FIG. 2. Chocolate starch sponge coated in milk chocolate. A cross section of the confection is shown at the right.

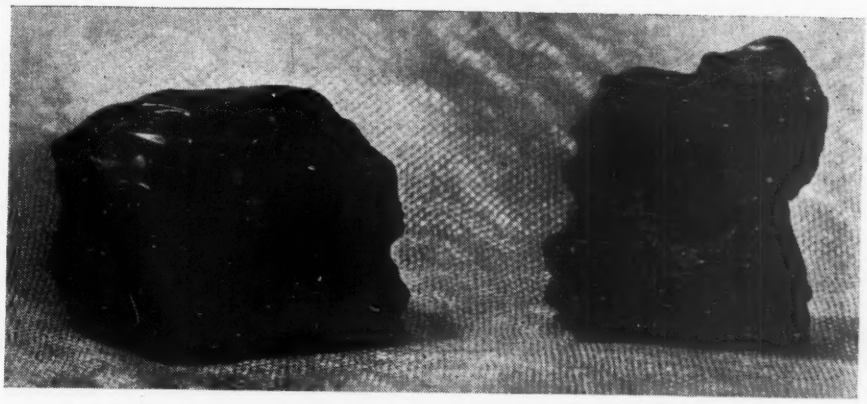


FIG. 3. Starch sponge square impregnated with chocolate and coated with dipping chocolate. A cross section of a "square" is shown on right.

dration and accompanying partial orientation of the starch during freezing. The orientation is probably due, in part at least, to the pressure of the ice crystals. The only volume increase during formation of the starch sponge is that attributable to the increase in volume of water upon freezing. Since freezing operations are more costly than heating operations, starch sponge costs more to make than does bread.

That frozen starch paste has a spongy character when thawed has been known for over 100 years.[2] In 1912, reference was made to the fibrous nature of frozen starch paste and to the fact that the paste had been seriously proposed as a material for paper making before wood pulp was known.[3] Curiously enough, little further attention has been given, until recently, to this striking change in the properties of the paste. Almost no previous attempt has been made to turn this change in properties to practical use.

To illustrate specifically the results obtained at the Northern Regional Research Laboratory, the following directions and formulas will indicate typical ways in which starch sponge can be prepared on a laboratory scale and how it may be used as a human food constituent.

Preparation of Sponge

Experimental batches of sponge are easily prepared. Fifty grams of corn or wheat starch is suspended in 100 g. of cold water. This slurry is poured slowly into 850 g. of water at or near boiling temperature in a 2-liter Erlenmeyer flask. As the slurry is added the flask is swirled to give a smooth paste which is heated 5 to 10 minutes in a boiling water bath.

Upon removal from the bath, the paste is poured into freezing trays and frozen in an electrical freezing unit, the temperature of which is held between about –2 and –16 deg. C. If the paste is allowed to stand for several hours or longer before freezing, the starch retrogrades and the sponge subsequently formed is hard and brittle even when wet. The slower the freezing, the coarser is the sponge.

An extremely fine sponge can be prepared by supercooling the paste and then allowing it to freeze rapidly at about –16 deg. C. This sponge is so fine, however, that it breaks and mats upon being pressed and dried in the usual manner, although it has been successfully dried out of alcohol. After the paste has completely frozen, usually in 12 to 24 hours, the trays are removed and the frozen starch allowed to thaw. When completely thawed, the sample—now a spongy, porous mass—is pressed or filtered by vacuum on a Büchner funnel under a rubber dental dam to remove much of the water. It may then be held under compression while drying to give a product of cracker-like texture, or it may be allowed to expand in the air if a light and porous product is desired. The semi-dry sponge is further dried in a forced-draft oven at room temperature for the first hour or two and, finally, at 80 to 100 deg. C.

The procedure for preparing a sponge containing flavoring, fruit or vegetable pulp, or other edible materials is essentially the same as described. These ingredients can be added either before or after making the paste. If the added material is water-soluble, some of it will be lost in the liquid expressed from the thawed sponge. This liquid can, however, be used in preparing the next batch of paste, with consequent lowering of the overall loss.

The temperature of drying sponge containing food material in addition to starch is dependent on the stability of the added ingredient. If egg, for example, is incorporated into the sponge, a lower temperature, such as 40 deg. C., must be maintained throughout drying.

Impregnated with Chocolate

Dried sponge is cut into bars or squares and impregnated with medium dark sweetened chocolate coating to which 30 percent cocoa butter has been added. Impregnation is effected by immersing the sponge pieces in the liquid impregnating material and holding under vacuum for 30 to 45 minutes. The impregnated sponge is removed from the chocolate and placed on a rack to solidify. The entire mass is then coated in dipping chocolate. An unusual confection results. It does not deteriorate in quality at room temperature in cardboard boxes for periods as long as four months.

Chocolate Sponge

Fifty-five parts by weight of finely shaved liquor chocolate is added with vigorous stirring to a hot paste containing the following ingredients:

	Parts by weight
Commercial cornstarch (10% mixture)	60
Sugar	45
Salt	3
Water	895

Solvent-extracted soybean flour or straight wheat flour can be substituted for as much as 20 and 50 percent, respectively, of the starch.

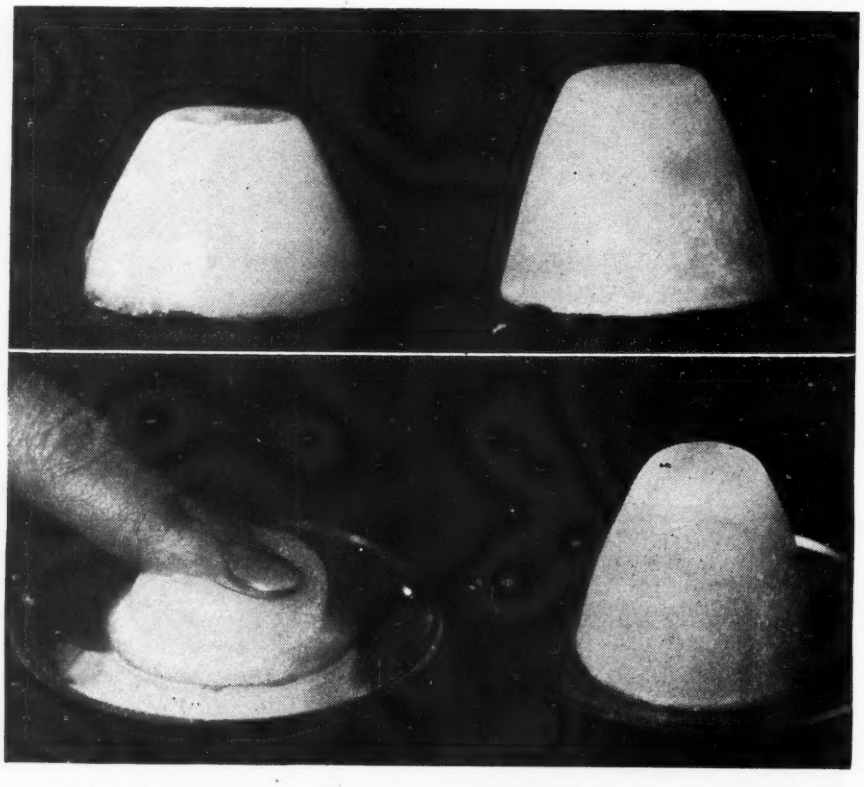


FIG. 4. At the upper left is an unfrozen starch gel and, next to it, the same gel after freezing and thawing. Below is illustrated the easy manner in which much of its water content can be pressed out of a starch sponge and the completeness with which the water is reabsorbed as the released sponge returns to its original shape.

FIG. 5. Starch sponge as it looks (left to right) when shredded, coarsely and finely ground.

The well-blended mixture is frozen and thawed in the usual manner. After pressing, the sponge is finally dried at 40 deg. C. The resulting product is crisp in texture and has a pleasant flavor. It is far less hygroscopic than plain starch sponge, and retains its crispness after exposure to the atmosphere for 48 hours. For preparation of a confection, squares of dried chocolate sponge are coated in dipping chocolate.

By drying the pressed sponge under compression, as between pieces of coarse wire netting, a semi-sweet cracker-like product is obtained. It is very palatable.

Flavored, Crunchy, Milk Chocolate Bar

A sponge is prepared by freezing a starch paste containing the following ingredients:

	Parts by weight
Commercial cornstarch (10% moisture)	41.0
Sugar	15.0–20.0
Salt	1.5
Oil of anise or oil of peppermint	0.5–0.7
Water	531.0

After pressing, the thawed sponge is finally dried at 95 to 100 deg. C. to give a crisp product. This product is shredded or granulated and about 16 percent is incorporated into a molded milk chocolate bar. Unflavored shredded sponge can be similarly incorporated into chocolate bars or chocolate kisses.

Crunchy Dipping Chocolate

Fondant or fudge centers can be coated in chocolate containing coarsely ground or granulated sponge. About 14 percent of unflavored crisp starch sponge is incorporated into the dipping chocolate. Fudge or flavored fondant centers are then enrobed in this crunchy coating to produce a new type of confection.

A variant of this formula, one that has received favorable comment from tasting panels, is obtained by flavoring the chocolate with almond and coating it on a vanilla fondant. The effect is similar to that of ground almonds in the chocolate coating.

Shredded Almond Sponge

Shredded almond sponge is prepared by freezing a paste containing the following ingredients:

	Parts by weight
Commercial cornstarch (10% moisture)	39.0
Sugar	8.0
Almond flavoring	10.0
Salt	0.5
Water	661.0

The pressed sponge is dried at 50 to 60 deg. C., to a crisp state, and is then shredded. The product may be used in cake icings or on candies, similarly to shredded coconut or shredded nutmeats. If the sponge is glazed while dry, it will have less tendency to absorb atmospheric moisture and become tough.

Bean Sponge Wafers

A bean-flavored sponge is prepared by freezing a paste containing the following ingredients:

	Parts by weight
Commercial cornstarch (10% moisture)	39.0
Homogenized bean soup concentrate	84.0
Salt	6.0
Water	578.0

The pressed sponge is dried under compression between pieces of coarse wire netting. A pleasingly crisp wafer is obtained.

Further Information

The effect of freezing on the macroscopic and microscopic appearance of 5 percent wheat- and corn-starch gels has been investigated in detail by Woodruff and MacMasters.[4] When the starch gel is frozen slowly at a temperature near –3 deg. C., much of the water held by the starch in the form of water of hydration crystallizes, and the space occupied by the ice crystals forms the interstices of the sponge on thawing the frozen mass. Microscopically, the sponge is composed of strands, fibers, and sheets of starch material, in which starch granules are rarely discernible. Those that can be seen are twisted and distorted in shape. Portions of the walls of the pores in the sponge exhibit strong birefringence, thus indicating that the molecules are at least partially oriented. This is a desired condition since it confers strength to the sponge.

Woodruff and MacMasters also have shown that under certain freezing conditions a starch gel is not converted to a spongy mass. If frozen below –25 deg. C., the gel contains tiny ice crystals in contrast to the large, coarse ice crystals present in a gel frozen at –3 deg. C. On thawing, the gel frozen at –25 deg. C. differs in appearance but little from the original unfrozen gel. It has become slightly weakened and no longer has a shiny appearance. Individual granules are clearly discernible in this thawed gel, and they have more sharply outlined forms and appear to be more rigid than those seen in the gel before freezing. Chains of granules are sometimes distinguishable, but there are no anisotropic strands and fibers, as formed at higher freezing temperatures.

The sponge may be dried either in the air or dehydrated by washing first with alcohol and then with ether without affecting the properties of the product. Birefringent strands, fibers and sheets of starchy material are still discernible in the dried sponge. Although crisp when dry, the starch sponge is hygroscopic and becomes tough as it increases in moisture content. After 24 hours of exposure to the atmosphere under ordinary laboratory conditions, the sponge loses its crispness, becomes tough and contains about 9 percent of moisture. Dry sponges that have been held at 100 percent humidity for one day

have a moisture content of 17 percent. On immersion in water, tough sponges behave like the dry product in that they take up many times their weight of water. A tough sponge readily can be converted to the dry brittle form by removal of the absorbed water in a heated oven.

On impregnation with water-soluble or fatty materials, the product obtained depends upon the characteristics and viscosity of the impregnating material. Comparatively little material is retained by the sponge when it is squeezed out of an aqueous solution of water-soluble substance, such as meat extract, sugar, glycerin and water-soluble vitamins, including riboflavin and niacin. Under the same conditions, however, oils and materials only slightly soluble in water —such as oil of peppermint, oil of anise, sulfanilamide, chocolate and presumably the fat-soluble vitamins —are absorbed almost completely and retained in the sponge. Treatment of a dry sponge with a fatty material, such as a thin mixture of cocoa butter and dipping chocolate, almost completely fills the pores of the sponge. With heavier or very thick sirups, only those pores in the outside portions of the sponges are completely filled. The degree to which the sponge is filled is dependent upon the viscosity of the material with which the sponge is impregnated. After incorporating fatty materials, the spongy framework is still brittle and stays in this condition for at least a few months. When starch sponge is impregnated or mixed with substances containing an appreciable amount of water, such as a fondant, the sponge will lose its crispness and become tough. Because of the hygroscopicity of the sponge, unless coated with a fatty material such as chocolate, it must be protected from humidity—as by special packaging or by glazing—if the crisp texture is to be maintained.

Acknowledgment

Grateful acknowledgment is made of the professional aid and advice of Fred J. Fahs, Fellow of the National Confectionery Association, working with the Agricultural Chemical Research Division, Bureau of Agricultural and Industrial Chemistry, New Orleans, La.

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4. S. Woodruff and M. M. MacMasters, Ill. Agr. Expt. Sta. Bull. 445, 1938.

Faster Packaging of FROZEN FOOD

Wide-opening bag-in-box container will speed filling operations. Such a package is described here, together with a device which saves time in setting it up

By WALTER M. FARRELLY, Package Engineer,
Cellophane Division, E. I. duPont de Nemours & Co., Wilmington, Del.

THERE is an acute need for more mechanization of packing lines in the frozen food industry. Several equipment manufacturers have on their drawing boards plans for completely automatic lines. These are expected to reduce labor cost to approximately 10 percent of that involved in the present lines. But these plans are definitely post-war, with one or two possible exceptions. In the meantime, it is desirable to take advantage of any improvements which can be made in hand filling and closing.

An expedient described here will reduce hand packing costs on fruit in sirup, possibly as much as 50 percent.

For the consumer pack, frozen food packages have become rather well standardized at 12 oz. for vegetables, the same size holding 16 oz. of fruit. The dimensions are approximately 4⅛x1¾x5⅜ in. The majority of the freezers now utilize bag-in-box construction, with a final overwrap.

Packages of this size lend themselves readily to plate or tray freezing, are economical to pack in shipping containers and fit the usual retail freezer cabinet with a minimum waste of space. They have an inherent disadvantage in that they are quite difficult to handle on a packing line.

Sirup or sugar packs of fruits, such as strawberries and sliced peaches, require leakproof construction. The usual practice has been to use an end-opening cellophane bag which is inserted into the carton and filled from the open end. This is a good, tight, leakproof package, but one that has been a labor-consumer.

Without losing the advantages of this size and shape, the speed and efficiency in packing can be increased by filling through the 4½x5⅜-in. face. Bags of the deep-gusset type, with any one of several different types of leakproof, liquid-tight bottom constructions, 5¼ in. wide and 4 in. across the gusset, are required. The bags should measure from 6 to 7 in. from the top edge of the bottom seal to the top of the bag, depending on the type of equipment to be used for the top seal.

Such a bag, opened and sitting in the carton, provides for very easy filling and weighing. It is easy to obtain, since practically all converters who make cellophane bags can produce a leakproof bag of the correct dimensions. Also, most bag-making machines used in food processing plants can be adapted to make the deep-gusset bags.

The disadvantage is that the bag must be opened within the opened carton and this requires some kind of bag-opening device.

An inexpensive wooden gadget that will do the trick is shown in the illustrations.* The experimental model shown here is hand operated, to show the steps. In practice it would have a foot-operated lever and be installed between the carton opener and the filling station.

The operator draws the deep-gusset bag over the spreader fingers, to a measured height, holds the open carton in position with the other hand and operates the foot treadle which releases the fingers, thus opening and positioning the bag in one operation. Release of the treadle drops the bag to the conveyor, ready for filling.

Filling

Hand filling without a funnel is made simple by the use of a dipper holding approximately the correct weight of fruit. The top is large

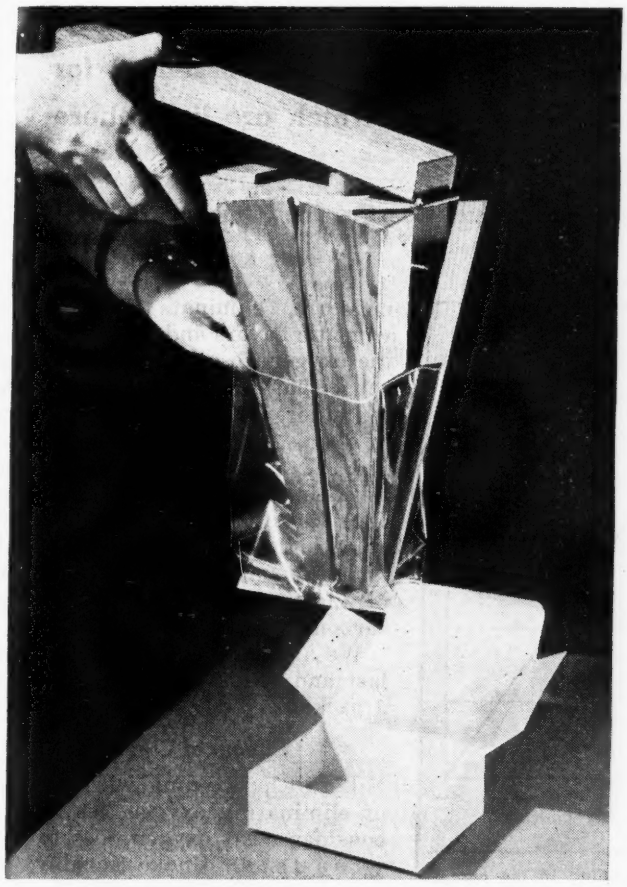
*Available from Amsco Packaging Machine Co.

enough so that adjustments in fill are easily made when weighing.

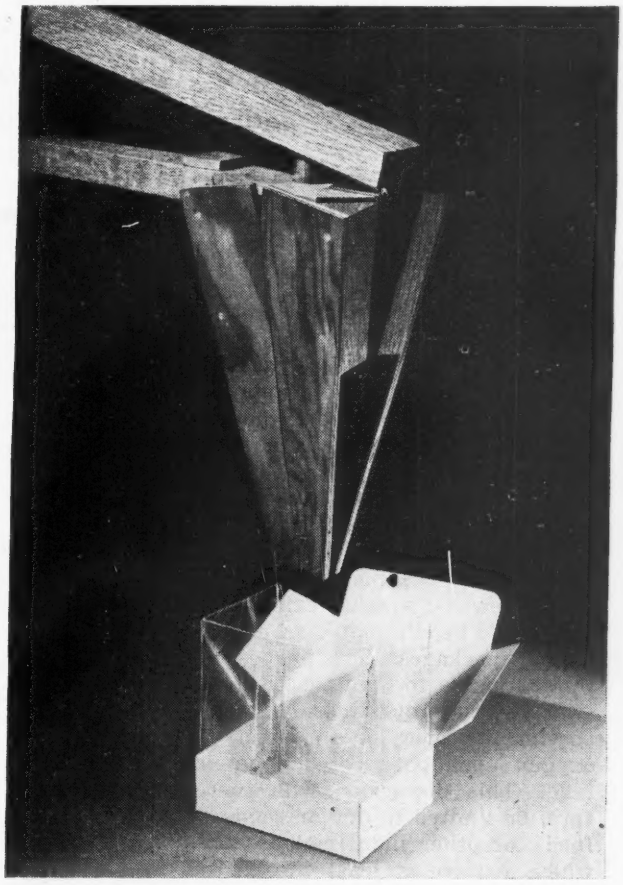
A filling machine of the Elgin type which has been used to fill sirup packs into the end-opening bags can be changed to fill the open-mouth bag. Because of the size of the opening, operation can be materially speeded, and attention now required to insure that the bag mouth comes under the filling nozzle can be eliminated or very much reduced.

Since this is a liquid pack, the bag must be kept in an upright position while being sealed. Rotary- or jaw-type crimp sealers may be used. Most packers will find that an efficient operation can be obtained by using the rotary heat sealer and passing the cartons through on a synchronized belt.

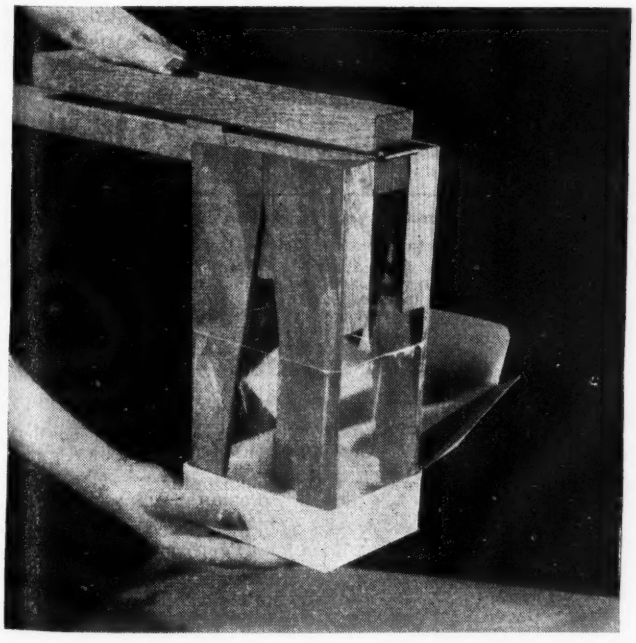
After sealing, the top of the bag is folded within the carton, which is then closed. A carton closer can be used if available. The package is then ready for the final overwrap.



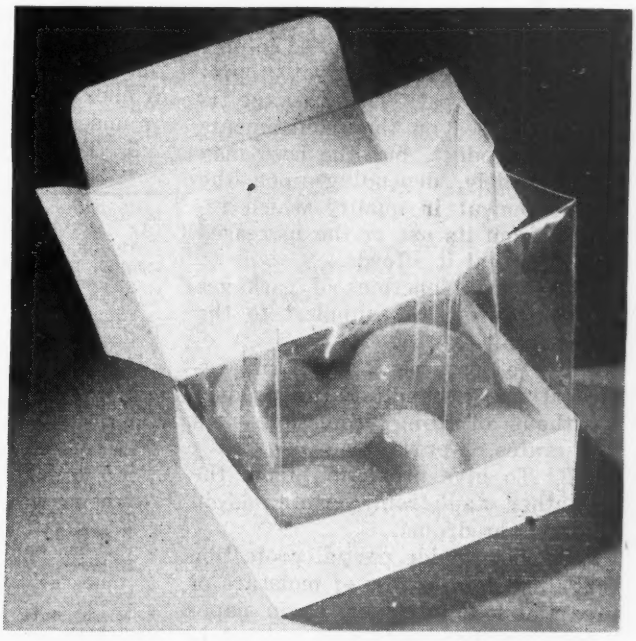
1. Operator slips deep-gusset bag over jaws of opener. In actual operation lever is connected with foot treadle.



3. Release of the lever drops the carton and the opened bag onto a table or conveyor, ready for filling.



2. The opened carton is placed in position.



4. The filled pack of fruit in sirup, ready for sealing and closing.

Take Oxygen Out of Cans To Improve Flavor and Quality

Commercial packing with low-oxygen content will lessen oxidative rancidity, reduce flavor loss and inhibit mold growth and infestation. It is essential for some dry or semi-dry foods. It is desirable for others which are listed here

By ROGER V. WILSON, Research Department, Continental Can Co., Inc., Chicago, Ill.

OXYGEN is a perpetual trouble maker with many food products. Millions of dollars have been spent on advertising the benefits of oxygen elimination and hundreds of technical and nontechnical articles have been written about it. Despite the abundance of information on the subject, there is still much confusion in the minds of some executives and technical men as to how, when and to what extent oxygen should be eliminated from commercial packages. The purpose of this article is to give practical answers to these questions. It is impossible to cover all the effects of oxygen upon packages in one article. This discussion will, therefore, be limited to dry or semi-dry foods, or other industrial products which require at least the partial elimination of oxygen for their preservation.

Functions of Packages

All packages are designed to perform specific functions at a predetermined cost. The package is usually based on the requirements of the product, but the cost may vary widely, depending upon the improvement in quality which results from its use or the increased sales appeal it affords.

The basic functions of packages varying from the simplest to the most complex are:

1. To serve as a means of segregating or handling the product without affording protection, such as crates or burlap bags.

2. To give protection from the weather and from vermin, as in barrels or drums.

3. To provide partial protection against gain or loss of moisture or partial loss in flavor, as in paper bags or fiber containers treated in various ways.

FIG. 1. Oxygen remaining in the can decreases linearly with increase of vacuum.

4. To provide a nearly perfect barrier to moisture-vapor-transmission and minimize flavor loss, as in foil-laminated or wax-dipped paper or fiber containers, friction top cans or unsealed glass jars.

5. To afford perfect retention of moisture, eliminate the loss of aromatic flavors and odors and limit the oxygen absorption in the product to that originally present in the container, by hermetically sealing in drums, cans or glass jars.

6. To furnish the protection given in 5, and, in addition, to reduce the amount of oxygen available to the product by keeping it under vacuum or in an atmosphere of inert gas such as nitrogen or carbon dioxide.

We are here concerned with this last and most complex function of a package.

Effects of Oxygen

Before proceeding with methods of eliminating oxygen, let us first consider what oxygen does to food products. Unquestionably, the greatest deleterious effect is upon flavor.

With those products which contain fat, rancidity or staleness is undoubtedly a prime cause of off flavor. Rancidity is caused by oxidation of the fat, the rate of development being affected not only by the amount of oxygen available but

Commercial Packaging for One-year Marketing Period

Among the products tested in Continental Can Co. Laboratories, the following:

Require less than 2 percent oxygen	Should have less than 5 percent, do not require less than 2 percent oxygen	Should have less than 2% per cent, do not require less than 5 percent oxygen
Coffee	Dehydrated products:	Dehydrated products:
Dehydrated products:	Tomato soup mx	Apricots
Carrots	Vegetable soup mix	Peaches
Cabbage	Hominy	Onions
Whole milk powder	Sweet potatoes	Buttermilk
Whole eggs	Malted milk powder	Whey
Cranberries	Ice cream mix	Chocolate drink powders
Chicken noodle soup mix	French - fried corn chips	Dried figs
Lemon powder	and carrots	Lard
Dry vitamin preparations	Shoestring potatoes	Shortening
Wheat germ	Potato chips	Peanut butter
Nuts	Candy:	Nut butters
Brazil nuts	Fudge	Candy:
English walnuts	English toffee	Peppermint sticks
Filberts	Caramel corn	Coconut brittle
Almonds	Popped corn	Pinion nuts
Pecans	Peanuts	Cereals
Mixed nuts	Bacon	— — — —
Crackers	Chipped beef	— — — —
Cookies	Gelatine desserts	— — — —
Pumpernickel	Cornmeal	— — — —

also by the moisture content of the product and the catalytic effect of light. But, aside from this effect on fats, oxidation of aromatic flavor components may entirely alter the characteristic flavor of the product.

The color of foods is an important factor in their salability. Oxidation may result in darkening or in bleaching of the color, frequently causing an unnatural or unattractive appearance.

Rusting or corrosion of the interior of containers may occur, particularly if the moisture content of the product is high. The elimination of oxygen in the container prevents rusting.

The nutritive value of many foods is affected by oxygen, vitamins A and C being particularly susceptible to destruction.

The growth of insects and vermin in many food products constitutes a serious problem. In the substantial absence of oxygen, insects and vermin in all stages of development are killed.

The growth of mold is inhibited by the absence of oxygen. However, contrary to popular belief, oxygen elimination only inhibits those bacteria which require it for growth and is favorable to the development of anaerobic bacteria.

How Much Oxygen?

Having reviewed the ill effects of oxygen, the question immediately arising is how much oxygen must be eliminated. Generally speaking, if the substantial absence of oxygen is required to preserve the product, the amount of oxygen in the container should be less than 3 percent. There are, however, other factors which modify this generalization. For example, the moisture content of the product definitely affects chemical reactions, including the development of rancidity. Strong flavoring materials may overshadow staleness or off-flavors, thus making oxygen content relatively unimportant.

In discussing oxygen content, it should be emphasized that when a product is sensitive to oxidation, even though it is commercially satisfactory when packed in a container having 3 percent oxygen, its quality is usually better if the oxygen is reduced to 1 percent. The usual procedure is to package with the lowest oxygen content commensurate with the expense involved. As an example, let us consider the packaging of peanuts.

The oils and fats in peanuts are relatively stable and do not become rancid as rapidly as the oils in other nuts. In spite of this, the merchandising of peanuts is such that the great majority of them are somewhat rancid when the consumer gets them. Judging from the quantities sold to the American public, this quality is acceptable. Yet those firms that saw fit to package peanuts with oxygen contents in the neighborhood of 5 percent found that their products had a ready sale. By packaging in containers having 1 percent of oxygen or less, a few firms obtained even better results. Under these conditions, the peanuts delivered to the consumer were nearly roaster-fresh and remained so for more than a year.

Before proceeding to the commercial methods of eliminating oxygen, it might be well to bring out the relation between the vacuum which is drawn upon a container and the oxygen which remains in it. Fig. 1 is a chart showing this relationship. Since it is the amount of oxygen in the container that is the important factor, it is immaterial whether a vacuum exists in the container or whether an inert gas has been substituted for the oxygen, so long as the amount of oxygen is low enough to preserve the product. This point should be kept in mind through the discussion which follows.

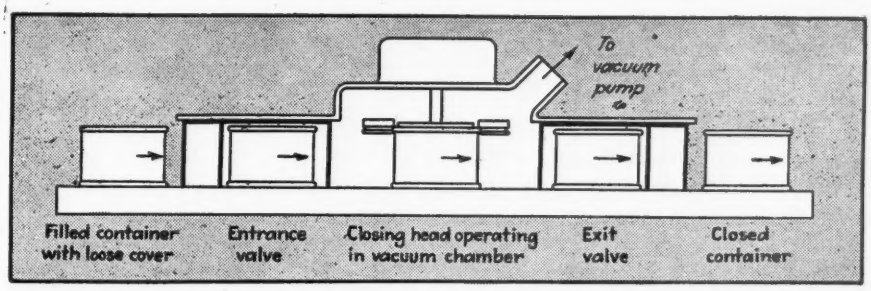


FIG. 2. Steps in the usual procedure for closing a can with contents under vacuum.

Typical commercial installation for vacuum packing, showing the steps of filling, placing lids on cans, vacuumizing and sealing, and cartoning.

Vacuum Packing

There are two generally accepted commercial methods of eliminating oxygen in containers: vacuum packing and inert-gas packing. Of the two, vacuum packing is the oldest and by far the most widely publicized. The principles involved in vacuum packing will, therefore, be discussed first.

The fundamental principle used in most commercial vacuum packing operations is that of placing

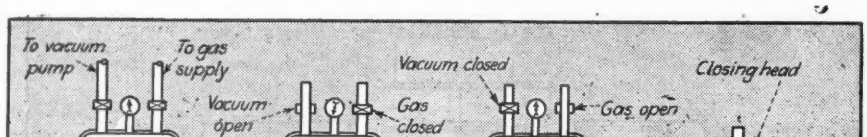
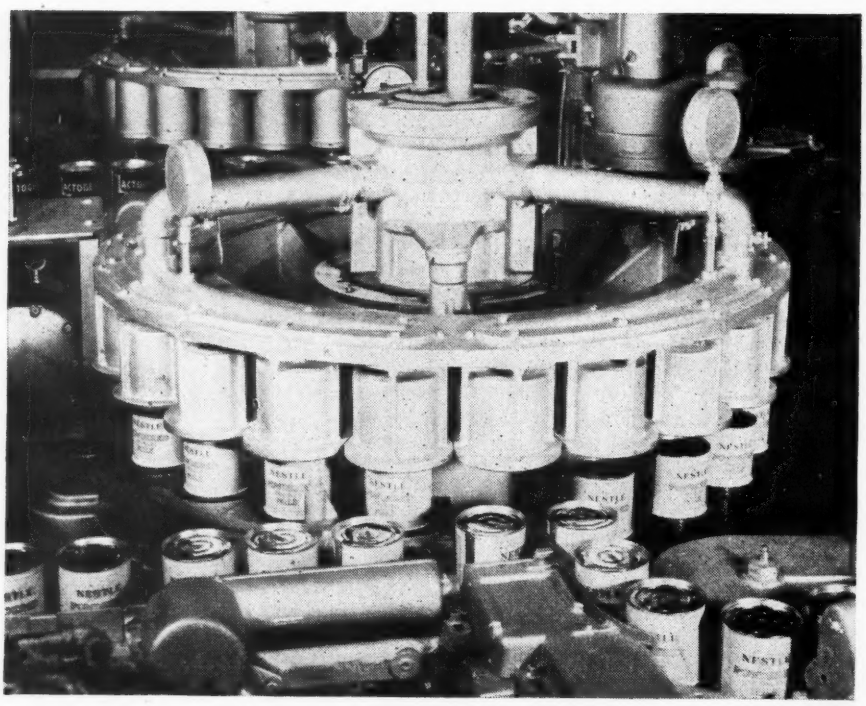


FIG. 3. Operations in removal of oxygen and can closing with contents under inert gas at atmospheric pressure.



Commercial machine for nitrogen packing.

the filled container in a chamber which is under vacuum and hermetically sealing the container while it is in that chamber. Fig. 2 is a diagrammatic sketch illustrating this. The valves allow the containers to enter and leave the machine continuously without relieving the vacuum. It will be noted that the filled containers, with loose covers on them, enter the vacuum chamber where they are closed, and that the closed cans are then removed from the chamber. Although not all commercial vacuum closing equipment operates in this manner, the great majority of it is so designed.

It should be pointed out that whenever a valve is used for the entrance or exit of the containers, considerable quantities of air are constantly introduced into the vacuum chamber. This air, expanded under the vacuum in the chamber, necessitates rather large vacuum-pump capacity to maintain reasonably high vacuum. This factor may make it extremely costly to maintain vacuums above 29 in., which, in turn, means oxygen contents in the containers of 0.7 percent or less.

Commercial vacuum closing machines operate at speeds varying from 50 to 125 containers per minute. Thus vacuum packing is a convenient, inexpensive high-speed means of closing containers with moderately low oxygen content. In existing equipment it is rather costly to attempt to maintain the oxygen under 1 percent.

From a merchandising standpoint, vacuum packing offers considerable advantage because of the millions of dollars which have been spent in advertising its merits. Several companies have capitalized on this by vacuum packing products which do not require it. In one case, sales were tripled even though the product was no better when vacuum packed than it was before.

Inert-gas Packing

Although packing in inert gas has received but little publicity, it has been in commercial use for many years. Whole milk powder, for instance, has been so packaged without any mention of the packing method in either advertising or on the labels.

Several methods have been suggested and used, such as flushing the container with a stream of inert gas or using dry ice to flush the air from the container. However, by either method, in commercial production it is difficult to obtain oxygen contents consistently less than 4 percent. On the other hand, the combination of vacuumizing and gassing has been successfully used for years on such products as whole-milk powder, nutmeats, coffee and candy, where oxygen contents of less than 2 percent are necessary.

Fig. 3 illustrates the principle of the vacuum and inert-gas method. As will be seen from this diagrammatic sketch, the filled container with cover loosely applied, is placed in an hermetically sealed chamber. A vacuum of any desired degree is drawn upon the chamber, can and contents, then this vacuum is relieved with the inert gas. The container, with its cover still loose, is removed from the chamber while at atmospheric pressure and immediately sealed with any suitable mechanism.

Final closure can be made outside the chamber because the container is removed at atmospheric pressure.

It will be evident that the oxygen content will be dependent upon the vacuum drawn upon the chamber and contents, this relation being that illustrated in Fig. 1.

The inert gases commonly used for commercial gas packing operations are nitrogen and carbon dioxide, both of which may be purchased in convenient high-pressure cylinders. An inexpensive inert gas which is made by burning the oxygen out of air with either illuminating gas or charcoal, has also been used. The gas so produced consists mainly of nitrogen with smaller amounts of carbon dioxide, carbon monoxide, or both.

A high-speed vacuumizing-gassing machine will operate at speeds varying from 25 to 125 containers per minute, producing oxygen contents of 2 percent or less. Because the vacuum is drawn and relieved on a closed chamber, it is possible to secure oxygen contents of 1 per-

cent with far less vacuum pump capacity than is usually needed for a 3 percent oxygen content in commercial vacuum packing installations.

Because the gas-packed containers are under neither vacuum nor pressure, they have several distinct advantages. The method makes it possible to pack any size container with an extremely low oxygen content. The likelihood of leaking containers is greatly reduced because there is no strain on them while they are being shipped and handled. When there is a vacuum in the can, there is some likelihood of paneling due to rough handling. Also, a small leak in a gas packed can need not cause spoilage of the product, because there is no inrush of air, as is the case with a vacuum packed can. Perhaps the most outstanding advantage is that present commercial gas-packing equipment gives lower oxygen contents with less vacuum-pump capacity than is obtained with present vacuum packing equipment.

Selection of Method

Over a period of many years, the Continental Can Co. Laboratories have determined the packaging requirements of a wide variety of products. Basically, the problem is one of determining the oxygen content required to market the product in a satisfactory condition. The usual method of determining this is to package the product with varying oxygen contents, store the packages at various temperatures, and examine them at various times. The results of such a packaging test on one product, noodle soup mix, are illustrated in Fig. 4.

From the foregoing discussion it is evident that definite recommendations can rarely be made because practical packaging is nearly always a compromise between quality and merchandising cost. There are, however, a number of products which absolutely require a low oxygen content in order to be sold successfully. Similarly, there is a second group in which a low oxygen content is desirable, although not absolutely necessary. The keeping quality of a third group is improved by the partial absence of oxygen but does not require it. A number of products in each of these three categories were classified, assuming a one year marketing period. Although most products are marketed in much less time, the experienced merchandiser knows that regardless of his efforts, some packages will be held on retailers' shelves for a year or more. Consequently, good business judgment calls for packaging that will protect his reputation under the most adverse conditions.

It might appear from these data that it is possible to predict the packaging requirements of new products. However, this is not always true because commercial products of a given kind may be made by different methods and may also vary not only in ingredients but in the quality of those ingredients. Therefore, even though the complete composition of a product is known, it is impossible to predict the packaging requirements accurately.

From a practical operating standpoint, it is vital to determine the packaging characteristics of each new product so that it may be satisfactorily marketed at the lowest possible cost. Experimental packs in containers having varying oxygen contents, when properly interpreted, will give this answer. Most container manufacturers have laboratories properly equipped to make and interpret the results of such studies, the services of which are readily available.

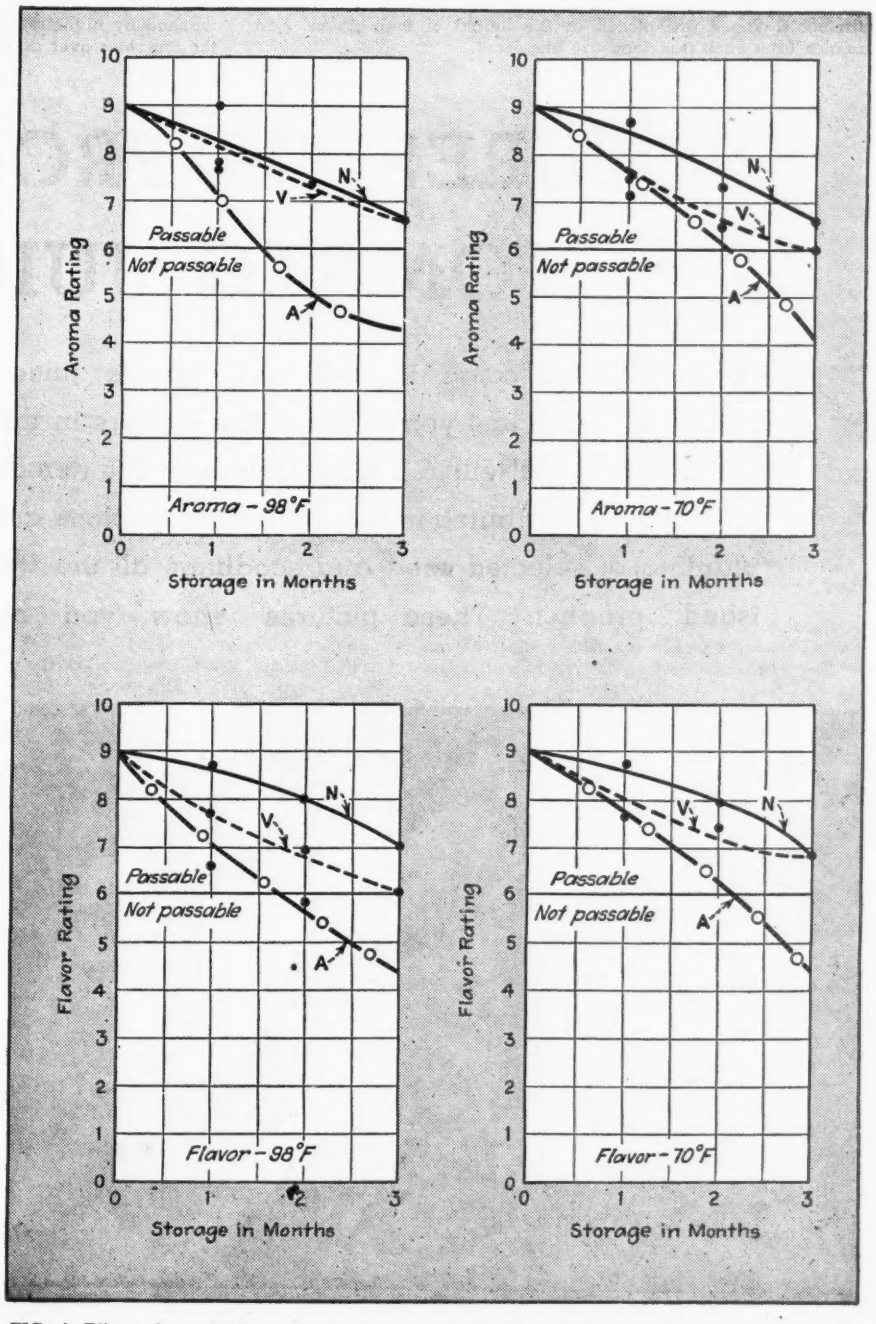
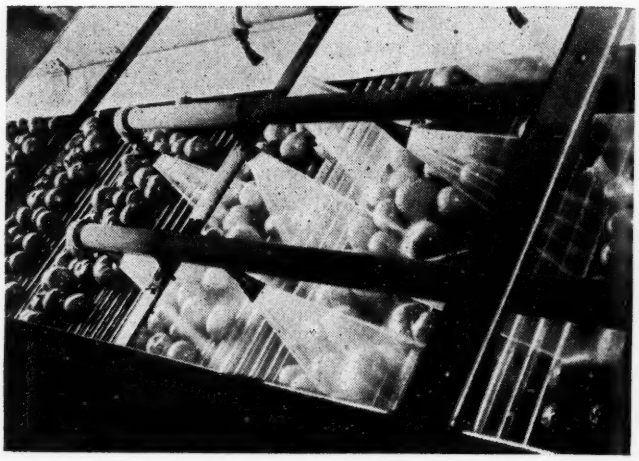


FIG. 4. Effect of residual oxygen in the can on flavor and aroma rating of noodle soup mix stored at 70 and 98 deg. F. for periods as indicated. Curves are designated: N, 1 percent residual oxygen in a nitrogen pack; V, 1.3 percent residual oxygen with a 28-in. vacuum; and A, 21 percent oxygen (air).

1. Only a few strains of the 300 varieties of tomatoes meet requirements. These are picked at the height of their flavor, and samples from each truckload are inspected.

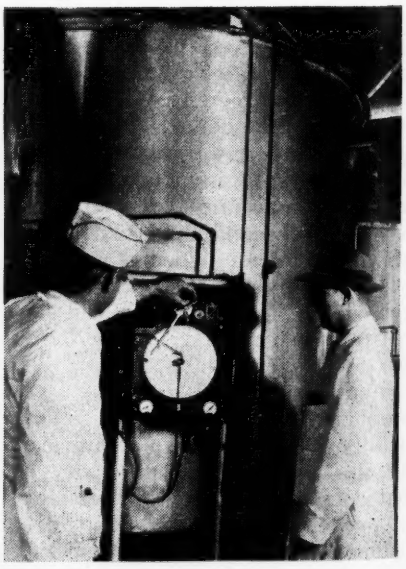


2. As they enter the cannery on a conveyor, the tomatoes are washed by high-pressure sprays. The rollers of the conveyor turn the tomatoes over as they are washed.

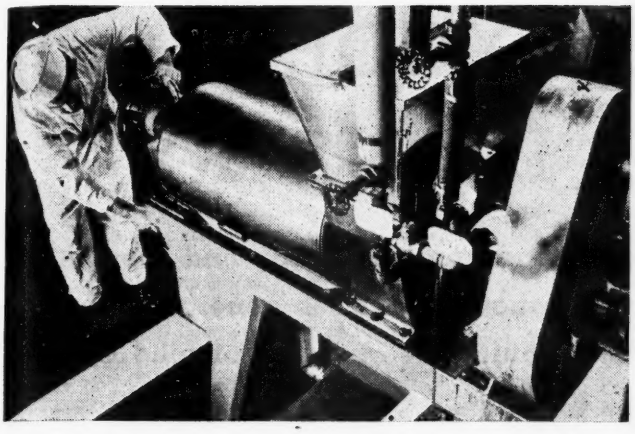
PICTURES OF PROCESSES — TOMATO JUICE —

From 1,339,000 cases in 1930, the tomato juice pack increased to 26,487,000 cases last year. One of the leaders in this fast-growing industry is Libby, McNeill & Libby, Chicago. The demand for Libby's tomato juice can be attributed in large measure to close quality control from the planting of selected seed and seedlings all the way through to the finished product. These pictures show you how Libby does it.

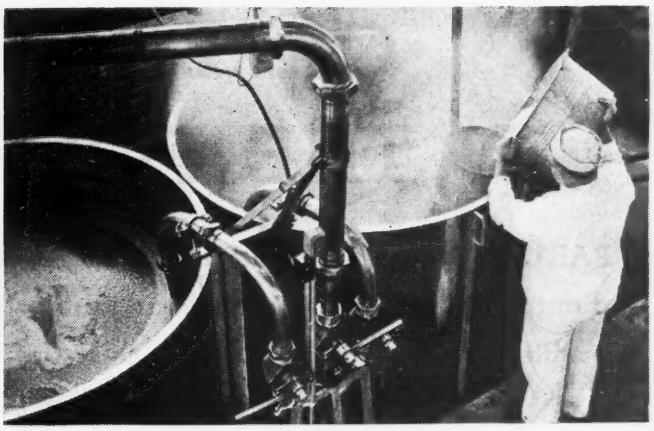
3. In the final inspection of the raw material, trained women workers look each tomato over as it passes on a roller conveyor and pick out faulty ones. The rejects are placed on a belt conveyor above the roller conveyor.



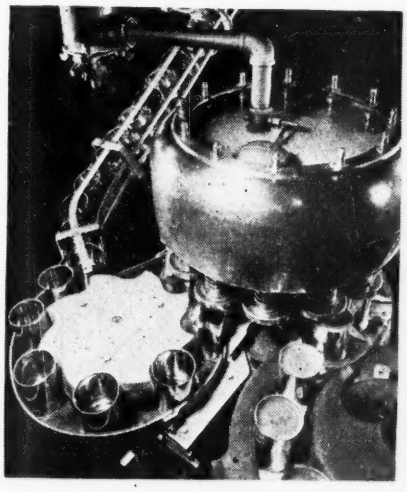
4. The tomatoes are crushed in an atmosphere of steam and heated in stainless steel tanks. Heating is automatically regulated.



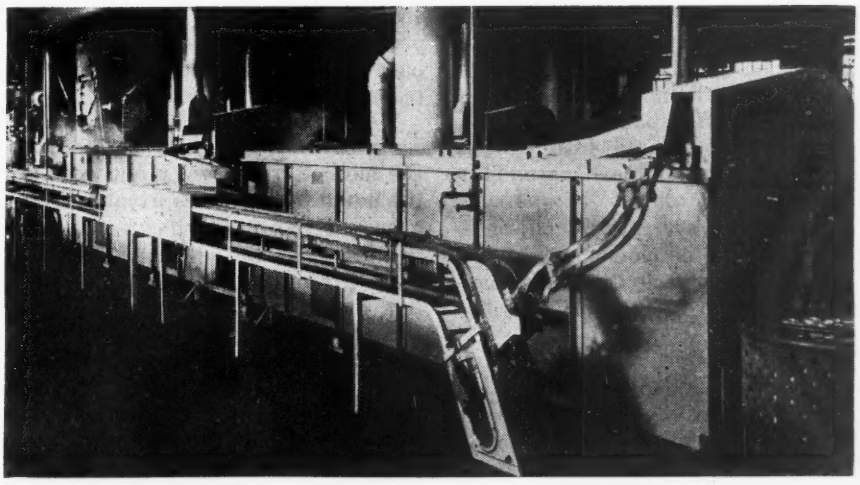
5. Pressing through fine-mesh screens squeezes the juice from the hot tomatoes and takes out the skin and seeds. Each press is watched constantly by an experienced operator.



6. In these tanks, a little salt is added to bring out flavor, no other seasoning being used. A sample of each batch is taken to the control laboratory for flavor and other tests.

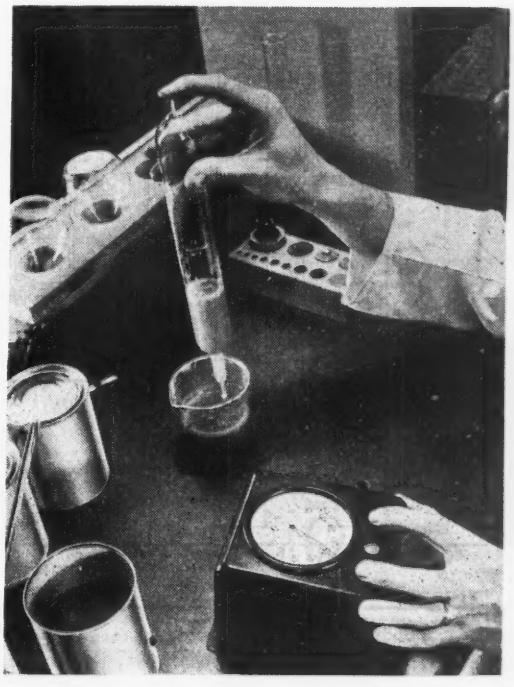


7. The juice is filled into cans which then go to the closer. These machines handle 10,000 cans an hour.



8. After the cans leave the closing machine they pass through the heat sterilizer at the left. Then they enter the cooling unit at the right where the temperature is quickly reduced preparatory to labeling. Quick sterilizing and cooling protect the flavor.

9. The labeled cans are put into shipping cartons at a rate of 700 cases an hour with the machine shown in the background. The filled cartons then travel by roller conveyor to the sealing operation and are ready for shipment.



10. Quality control begins with the selection of the seed and continues through each step of growing and processing. The final check is a series of laboratory tests for quality, color and body. Each batch is tested after canning.

CARBON DIOXIDE IN THE FOOD INDUSTRY

PART I—Generation and Purification—Some food processors may find it expedient to make CO_2 ice. Here an authority tells how the gas is generated and purified. Subsequently he will describe the manufacture and uses of solid CO_2

By GUSTAVE T. REICH, Consulting Engineer, Philadelphia, Pa.

CARBON DIOXIDE is a common constituent of foods. When the baker uses yeast, the sugar in the dough is decomposed into alcohol and carbon dioxide, the latter raises the bread and makes it light and spongy. Likewise, baking soda when heated is dissociated into carbon dioxide and sodium carbonate. This inert gas is almost 50 percent heavier than air, nearly odorless, nonexplosive, nonpoisonous (at a certain concentration) and is marketed in both the liquid and the solid forms.

Carbon dioxide is obtained from many processes—in the combustion of fuels, from the fermenting industry (especially in the production of industrial alcohol and in brewing beers) and from many of the chemical processes. Natural carbon dioxide, frequently of high purity, is obtained from surface springs or drilled oil wells.

The purity, concentration and yield of the carbon dioxide varies according to the raw materials processed. Table I shows the comparative yields from various materials.

Depending upon the purity and concentration of the carbon dioxide, the method of recovery and cost of the purification varies greatly. Flue gases or byproduct gases containing less than 50 percent CO_2 must pass through a gas-recovery system to remove inert gases, impurities, dust, dirt or other objectionable ingredients. Natural well gas or any substantially pure CO_2 byproduct gas—such as that from the fermentation industry—ordinarily can be compressed after a preliminary cleaning and deodorizing treatment. However, attention should be called to the fact that each project must be treated as an individual case, due to the fact that each type of impurity will require a different chemical treatment. For the recovery of carbon dioxide below a concentration of 50 percent, an absorption system must be used. The principle of the absorption and desorption cycle is shown in Fig. 1. The gas coming in contact with sodium carbonate (Na_2CO_3) and water combines to form sodium bicarbonate ($NaHCO_3$), which upon heating, splits up into carbon dioxide, sodium carbonate and water.

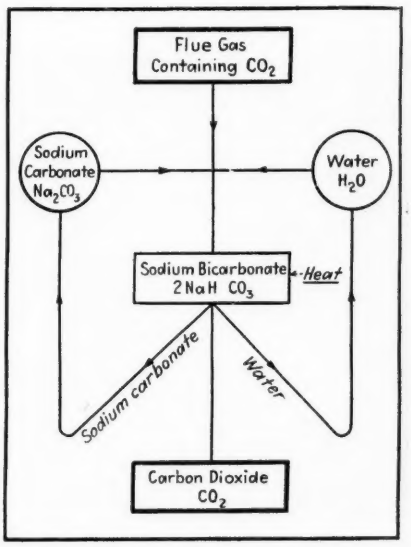


FIG. 1. Reactions in the standard absorption system.

The chemicals used for the absorption of carbon dioxide are either inorganic alkali compounds, such as sodium or potassium carbonate, or organic compounds like mono-, di- or tri-ethanolamine. A brief description of the various carbon dioxide recovery systems follows.

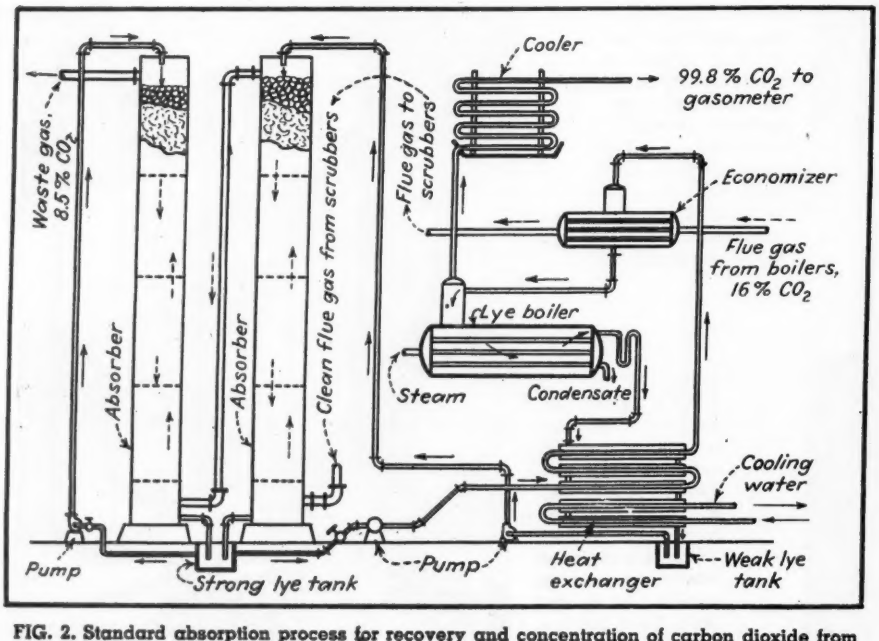


FIG. 2. Standard absorption process for recovery and concentration of carbon dioxide from flue gases.

Absorption Processes

Standard Lye Process—This is applied mainly to flue gases having a CO_2 content of at least 12 per-

Solid CO_2 Can Be Made Economically

Food processors who use large quantities of ice may well consider the feasibility of manufacturing solid carbon dioxide. The author estimates that this refrigerant can be made from fermentation gas for about $10 a ton and from other raw materials at a cost ranging up to $20 a ton. Consequently, the solid CO_2 can compete with water ice if the former is made at an average cost not to exceed $15 a ton (based upon part fermentation gas and part absorption gas).

Several typical methods of producing CO_2 gas are described in this article to enable the processor to choose intelligently the process best suited to his operation.

—The Editors.

cent. A general layout of such a plant is shown in Fig. 2.

When high-grade coke is burned under a boiler, the flue gases, freed of dust, pass through scrubbers filled with lump limestone and water, to remove the sulphur dioxide impurities. At this stage, the gas contains about 18 percent CO_2 and nitrogen, and it is forced through absorber towers (usually connected in series), where the flow of the lye solution and gas are countercurrent. Either potassium or sodium carbonate solution is used for this purpose. The concentration of the liquid is such that no solid separation in the absorber can take place. The absorbers are filled with coke over which the lye solution is circulated. In the absorber the following reaction takes place.

$$\underset{\text{Potassium carbonate}\ 138\ \text{lb.}}{K_2CO_3} + \underset{\text{Water}\ 18\ \text{lb.}}{H_2O} + \underset{\text{Carbon dioxide}\ 44\ \text{lb.}}{CO_2} = 2\ \underset{\text{Potassium bicarbonate}\ 200\ \text{lb.}}{KHCO_3}$$

The "strong lye" (potassium bicarbonate) from the absorber is pumped to the lye boiler where the process is reversed; "desorption" takes place, liberating pure carbon dioxide and "weak lye." The CO_2, after cooling, is collected in gasometers, and the weak lye is cooled by passing through water immersed coils (heat exchangers) and is returned to the absorber.

$$\underset{200\ \text{lb.}}{\text{Strong lye}\ 2\ KHCO_3} + \text{heat} = \underset{\text{Weak lye}}{K_2CO_3} + H_2O + \underset{44\ \text{lb.}}{CO_2}$$

Slurry, (Reich) Process[5,6]—The chemical used in this absorption process (Fig. 3) is sodium carbonate, which is much more soluble in water than sodium bicarbonate. Consequently, a solution containing a predetermined amount of sodium carbonate will precipitate sodium bicarbonate upon carbonation. This strong lye, containing sodium bicarbonate in suspension, is withdrawn from the absorber, is pumped into a settler and separated into a clear weak lye and a slurry containing the suspended sodium bicarbonate. The slurry passes to a dissociator, where carbon dioxide is liberated at around 220 deg. F. and the resultant hot, "clear lye" is withdrawn and mixed with the weak lye from the settler. These are then returned to the absorber. The advantages of this process over the standard lye process are the requirement of smaller equipment and greater absorption efficiency.

Girbotol Process (Girdler Corp.)[2]—The absorbing agents in this process are organic compounds, mono-, di- or tri-ethanolamine. They have an alkaline reaction and, diluted with water, are very good absorbents.

Figure 4 shows the Girbotol process, consisting of an absorption tower, reactivator and appurtenances such as heat exchangers, cooler and vapor scrubber. The amine solution at the proper dilution is circualted in the absorber, countercurrent to the flue gas. The cold strong lye from the absorber and the hot weak lye from the reactivator are countercurrently put through two heat exchangers to transfer the heat from the hot to

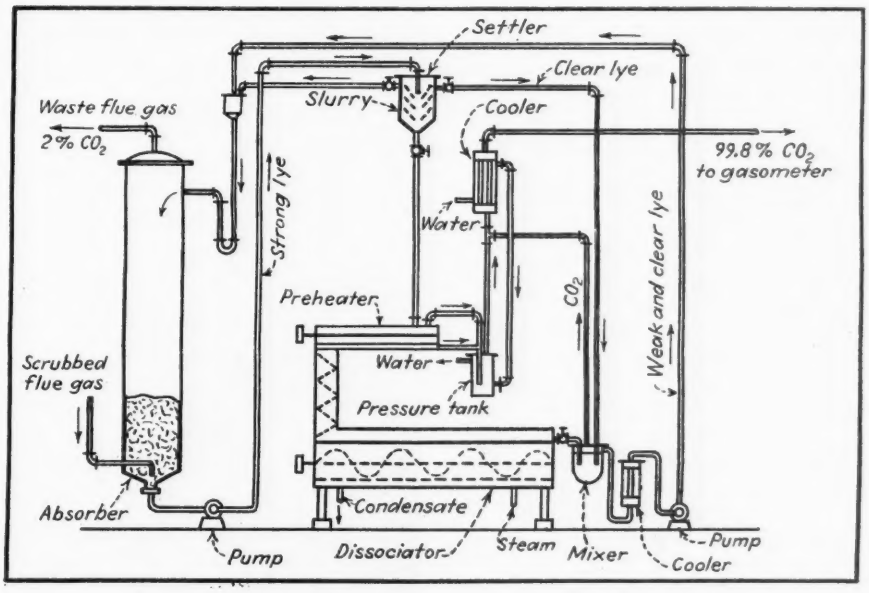


FIG. 3. Reich "slurry" process flow diagram.

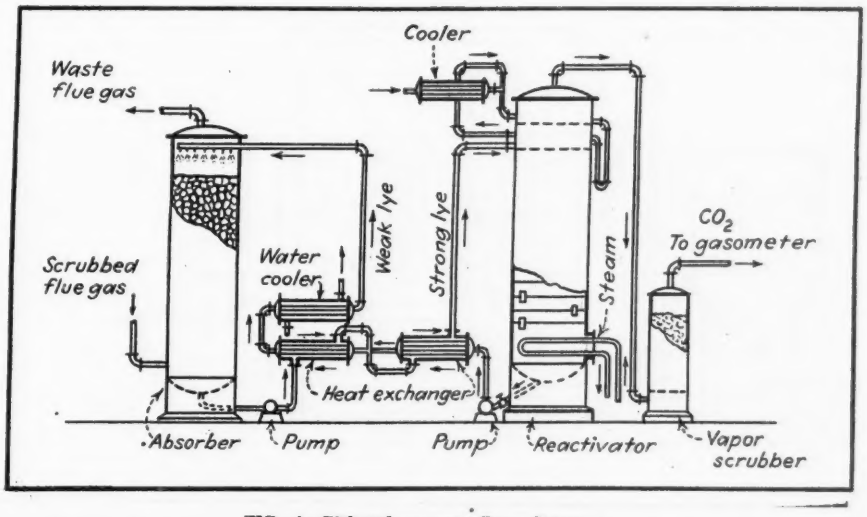


FIG. 4. Girbotol process flow diagram.

the cold solution. The strong lye after passing through the heat exchanger is pumped to the reactivator, which is similar in construction to a fractionating still. Here the liquid is dissociated by means of steam, stripped of its CO_2 and is returned to the absorber. This is a very efficient process and applicable to lean flue gases.

Recovery of Carbon Dioxide at a High Concentration

If the gas has a high percentage of CO_2, concentration of the gas is not necessary, but purification and deodorization are necessary. Natural gas, for instance, has a CO_2 content of 99 percent. Oil-well gas may contain 5 percent of methane and ethane. Therefore, the purification is an individual problem. High-grade CO_2 may be obtained from lime kilns and from the fermentation of carbohydrates.

Fermentation Gas

During the fermentation of molasses, corn, wheat and potatoes, large quantities of carbon dioxide are given off. To make alcohol, sugar must be fermented with yeast, which theoretically converts 51.1 percent of the sugar into alcohol and 48.9 percent into CO_2—practically half and half. Consequently, a distillery producing 10,000 gal. of alcohol also liberates 68,000 lb. of CO_2, of which only a part is recoverable, as shown in Table I. This CO_2 gas is of exceptional purity, averaging 99.8 percent CO_2. However, the gas has a grain or molasses mash odor which

(*Turn to page* 204)

TABLE I—Purity and Yield of Carbon Dioxide From Various Raw Materials

Raw material	Chemical formula	Content (percent CO_2)	Purity of gas (percent CO_2)	Yield in lb. liquid CO_2 per ton raw material	Percent of theoretical CO_2 recoverable
Wood	$(C_6H_{10}O_5)$	..	14	...	...
Coke	C	..	18	{ 1,540 { 2,350	34.0 47.0
Potassium carbonate	K_2CO_3	32	99-100	608	95.0
Sodium carbonate	Na_2CO_3	41	99-100	780	95.0
Potassium bicarbonate	$KHCO_3$	44	99-100	836	95.0
Limestone—98%[a]	$CaCO_3$	44	38	672	76.4
Dolomite—95%[a]	$CaCO_3 \cdot MgCO_3$	48	40	744	77.5
Magnesite[a]	$MgCO_3$	51	40	790	77.5
Magnesite[b, c]	.....	52	99.5	900	86.5
Sodium bicarbonate	$NaHCO_3$	52	99.5-100	1,040	95.0
Molasses[d]	$C_6H_{12}O_6$ $C_{12}H_{22}O_{11}$	..	99.5-100	420	84.0
Corn[e]	$(C_6H_{10}O_5)x$	..	99.5-100	558	84.0
Corn[f]	$(C_6H_{10}O_5)x$	..	60	...	...
Potatoes	$(C_6H_{10}O_5)x$	..	99-100	138	84

(a) Yields apply to limestone, dolomite or magnesite; coke added for the decomposition is omitted.
(b) Calcined in closed retorts.
(c) Treated with a mineral acid.
(d) One ton of molasses = 168 gal. and contains 50 percent sugar.
(e) One ton of corn = 35.7 bu. used for the production of ethyl alcohol.
(f) One ton of corn used for the production of butanol.

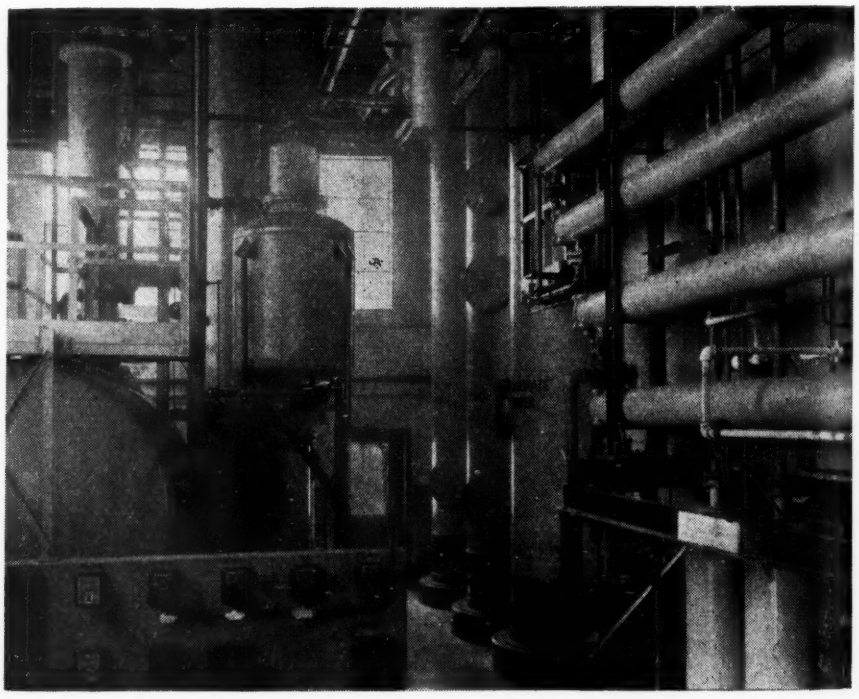


FIG. 6. (Right) Equipment used in Reich purification process.

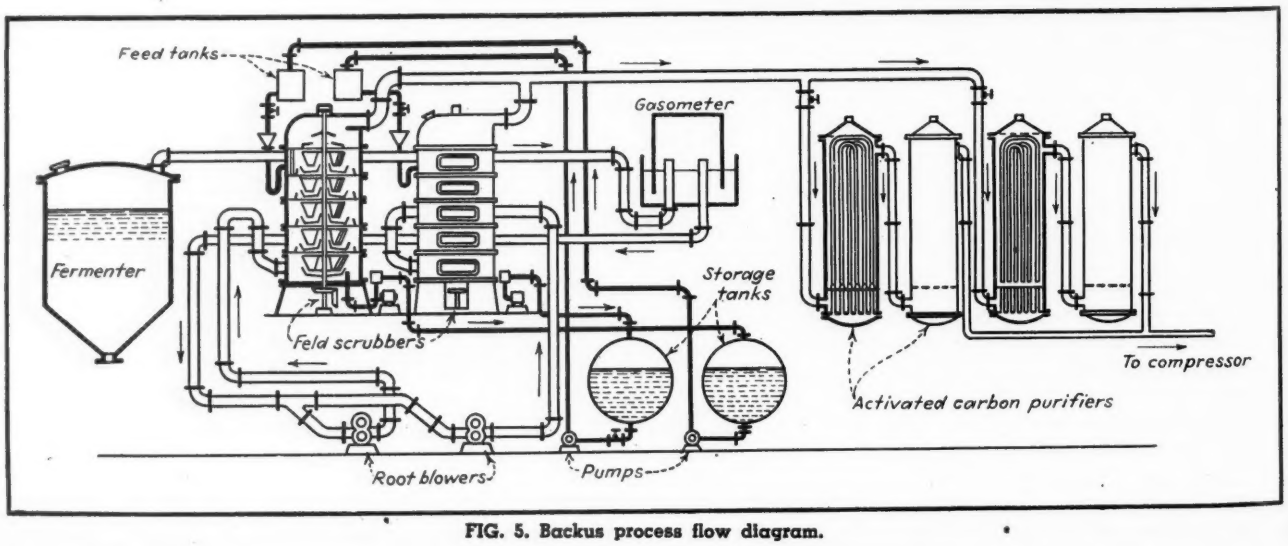
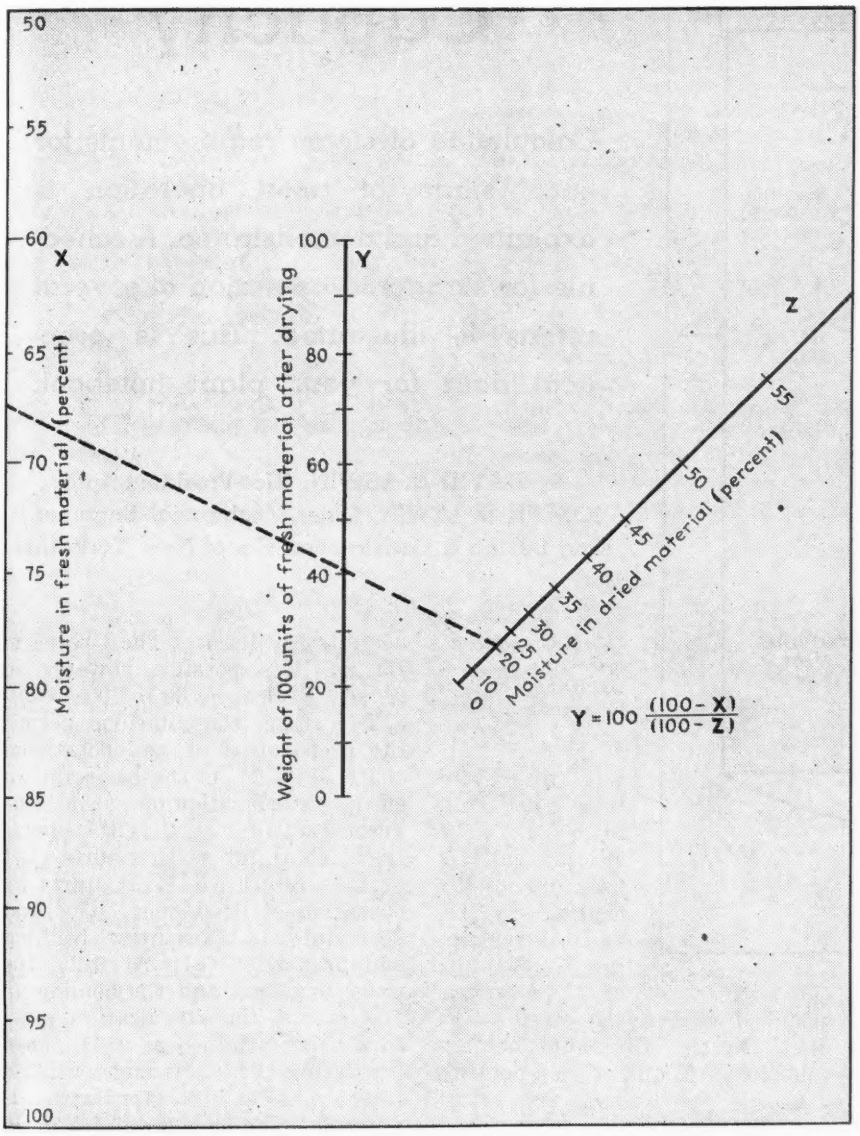


FIG. 5. Backus process flow diagram.

SHORTCUTS In Plant Operations


X
Y
Z
Moisture in fresh material (percent)
Weight of 100 units of fresh material after drying
Moisture in dried material (percent)
Y = 100 (100 - X) / (100 - Z)

Nomograph for drying calculations.

Drying Calculations Made Easy*

FOR those who have many moisture calculations to make in dehydration operations, or for nontechnical personnel who may have trouble with arithmetic, the accompanying nomograph will be a convenient tool.

Three functions are plotted on this alignment chart. On the left (X) axis is the original moisture content of the material. On the right (Z) inclined axis is the moisture content of the dried material. The (Y) axis at the center gives the weight to which each 100 units of the material must be dried to obtain the desired final moisture content (or the percentage of the original weight to which the material must be reduced). The equation relating the three variables also is given.

Suppose that it is desired to dry plant material containing 67.5 percent moisture (X axis) to a final moisture content of 20 percent (Z axis). To determine the weight to which the material must be dried, draw a straight line connecting 67.5 on the X axis and 20 on the Z axis. The point at which this line intersects the Y axis is the answer —40.6 percent of original weight.

This nomograph is offered as a general suggestion. For a specific type of material, it is best to prepare only a section of the nomograph over the applicable range and enlarge the scale manyfold.

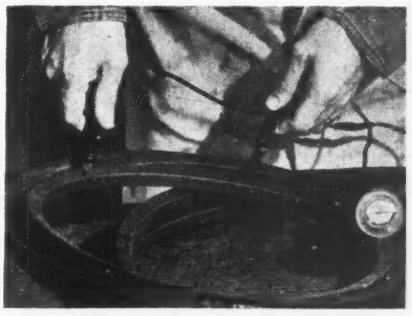
*Submitted by Merriam A. Jones, Agricultural Research Administration, U. S. Department of Agriculture, Mayaguez, P. R.

Testing Belts For Static Conductance

IT is easy to determine whether any rubber V-belt, flat belt, hose or other product is static conductive by a method developed by B. F. Goodrich Co. And that company recommends that all static-conductive rubber belts be tested for conductivity at least once a month as a precaution against a spark which might touch off explosive dusts, as in flour mills.

Equipment to make the test consists of a 5- or 6-ft. length of lamp cord with standard rubber socket plug, a 2-watt neon bulb, two ordinary clamps or metal prongs and two insulated handles. One of the wires of the cord is cut, the neon bulb inserted in a standard base, the insulated handle installed near the end of each wire and the two prongs or clamps attached to the two wires.

To make the test, part of the belt or other rubber product is moistened with water, leaving a dry section 8 to 12 in. long between the moistened surfaces. The testing assembly is plugged into a 110-volt a.c. outlet and the clamps or prongs applied to the moistened surfaces, with the dry in the middle. If the bulb glows, the rubber product is a static conductor. The article under test must be suspended in the air between clamping points, or rest on a table or other surface which has been insulated so that it is nonconducting.



Testing the static conductivity of a rubber V-belt.

How To Match Retort Output With Steam Capacity

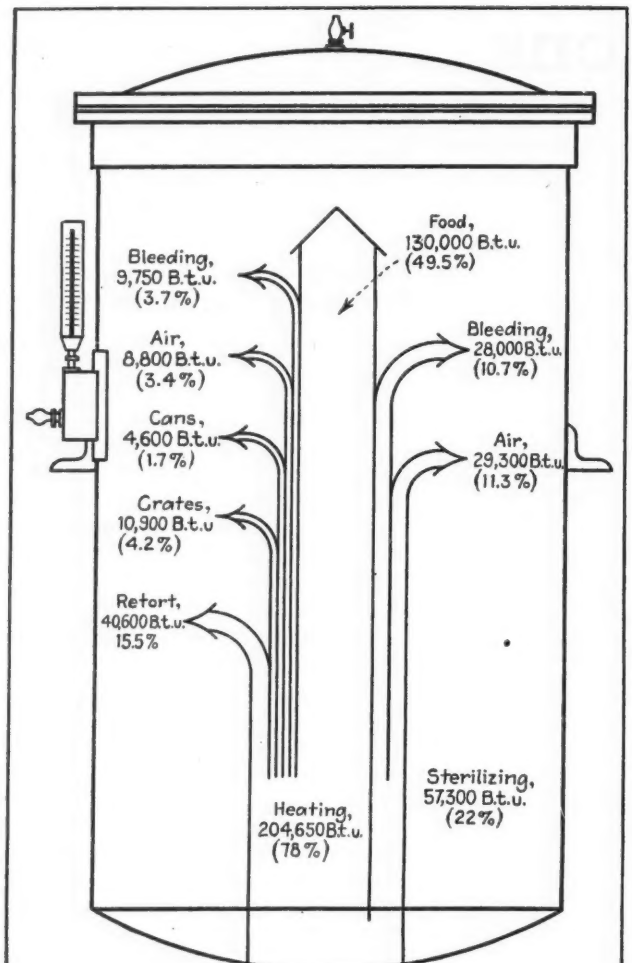


FIG. 1. Graphic representation of the distribution of heat in a vertical retort.

Calculation of steam requirements for each stage of retort operation is explained and demonstrated. A schedule for staggered operation of several retorts is illustrated. This is practical data for your plant notebook

By DAVID N. LEWIN, Vice-President, and JOSEPH D. LEWIN, Chief Mechanical Engineer, King Design & Construction Co. of New York, Inc.

STEPPED-UP production in canneries during the wartime years has forcefully demonstrated the necessity for computing retort steam requirements. Processors have had to make this computation to align steam capacity with production output, or vice versa. To do this, a knowledge of thermal requirements of different foods at the various retoring stages has been essential.

How steam requirements for vertical pressure retorts can be determined is explained in this article. And the heat requirements are given for different types of foods and the various steps of retort operation. This information is of practical value to any canner when he changes his production rate.

Figure 1 tells graphically the story of where the heat goes in retorting. A total of 261,950 B.t.u. is put in. From this amount, 204,650 B.t.u., or 78 percent, is used during the heating cycle, and the remaining 57,300 B.t.u., or 22 percent, is consumed during the sterilization cycle. In the 15-minute heating cycle, 40,600 B.t.u., or 15.5 percent, is needed for heating the retort and 10,900 B.t.u., or 4.2 percent, for heating the crates, while the cans absorb 4,600 B.t.u., or 1.7 percent. The retort radiates during this period 8,800 B.t.u. or 3.4 percent, and the heat loss due to discharge of steam through bleeders amounts to 9,750 B.t.u., or 3.7 percent. The product itself requires 130,000 B.t.u., or 49.5 percent, for sterilization. During the sterilization period, the retort radiation amounts to 29,300 B.t.u., or 11.3 percent, and the loss of steam through bleeders accounts for the remaining 28,000 B.t.u., or 10.7 percent.

This graphical representation calls to attention the fact that actually less than half of the heat is usefully utilized. The rest is wasted. It is possible, however, to reduce this loss by 60 to 70 percent.

The steam computations permit the preparation of an operational chart (Fig. 2) as the basis for an efficient sterilization operation. The lower part of Fig. 2 is the operational chart for seven retorts. Let us take retort No. 1. It starts its operation at 0:00 hour. The first 20 minutes is taken up with filling and preparing (*e*). At 0:20, the cover is closed and the coming-up (*a*) starts, the sterilization pressure being attained at 0:35. Then processing (*b*) starts and continues for 50 minutes until sterilization is finished. The blow-down (*c*) of 10 minutes is followed by 15 minutes of cooling (*d*) until the normal pressure is reached. The retort time is 110 minutes or 1½ hours. The retort now can be emptied and refilled for the next operation.

The steam requirements are given in the upper graph of Fig. 2. Until 0:20, no steam is used. Then coming-up starts, the valves are fully opened, and the steam demand rises to 650 lb. per hour. If only one retort were operating, the steam demand would drop to 60 lb. during the processing and to zero for blowdown and cooling.

For effective utilization of steam capacity, it is essential to stagger the coming-up period of the several

retorts. Were the second retort to start the heat-consuming, coming-up period while the first retort was still coming-up, the 30-hp. boiler capacity would not be sufficient. It would be difficult to maintain the pressure and temperature in both retorts. Therefore, the operation of retorts should be staggered as shown in the lower part of Fig. 2. If this is properly done, a 30-hp. boiler would operate seven retorts efficiently.

The fuel demand for the operation illustrated can be computed. The heating cycle requires 204,650 B.t.u. in 15 minutes, or 819,000 B.t.u. per hour. The total demand is 888,000 B.t.u. per hour. From Fig. 2, it is evident that the full capacity is required for about 6.5 hours. Therefore, in this period, $6.5 \times 888{,}000 = 5{,}770{,}000$ B.t.u. is used. With fuel oil yielding 18,000 B.t.u. per pound and a steam generator of 70 percent efficiency, the daily requirement would be

$$\frac{5{,}770{,}000}{18{,}000 \times 0.70} = 467 \text{ lb. or } 61 \text{ gal.}$$

The thermal process can be considered as consisting of two cycles, namely:

1. The "heating" cycles, during which the retort, the crates or baskets, the containers or cans, and part of the product is brought to the sterilization temperature.

2. The "sterilization" cycle, during which the remaining part of the product is brought to the sterilization temperature and the entire product kept at this temperature for the "thermal death time."[2]

The heat requirement to heat up a body is expressed by the general equation:

$$Q = \int_{t_i}^{t_s} W \times C_v \times dt = W \times c_v \times (t_s - t_i)$$

where

Q = quantity of heat absorbed by the body in B.t.u.

W = weight of substance, in pounds.

C_v = specific heat of substance in B.t.u. per pound per degree Fahrenheit. c_v should be established for every product by a simple laboratory test. For rough estimates, the following values can be used:

Product	c_v
Water	1.0
Fruit juices	0.8 to 0.9
Vegetable juices	0.8 to 1.0
Vegetables	0.6 to 0.9
Fruits	0.5 to 0.8
Fish (boned)	0.7 to 1.2
Meats (boned)	0.9 to 1.4

t_i = initial temperature of substance, or starting temperature, in degrees Fahrenheit.

t_s = sterilization temperature in degrees Fahrenheit.

The following example will facilitate use of the various equations.

Design Data

Product:

Eggplant puree, 80 percent solids, 28,000 No. 2 cans per day at 1.11 lb. per can.

Specific heat of puree, $c'_v = 0.8$ B.t.u./lb./°F.

Specific heat of juice, $c''_v = 0.9$ B.t.u./lb./°F.

$$c_{v1} = 80 \times 0.8 + (20 \times 0.9)$$

$$c_{v1} = \frac{(80 \times 0.8) + (20 \times 0.9)}{80 + 20} = 0.82 \text{ B.t.u./lb./°F.}$$

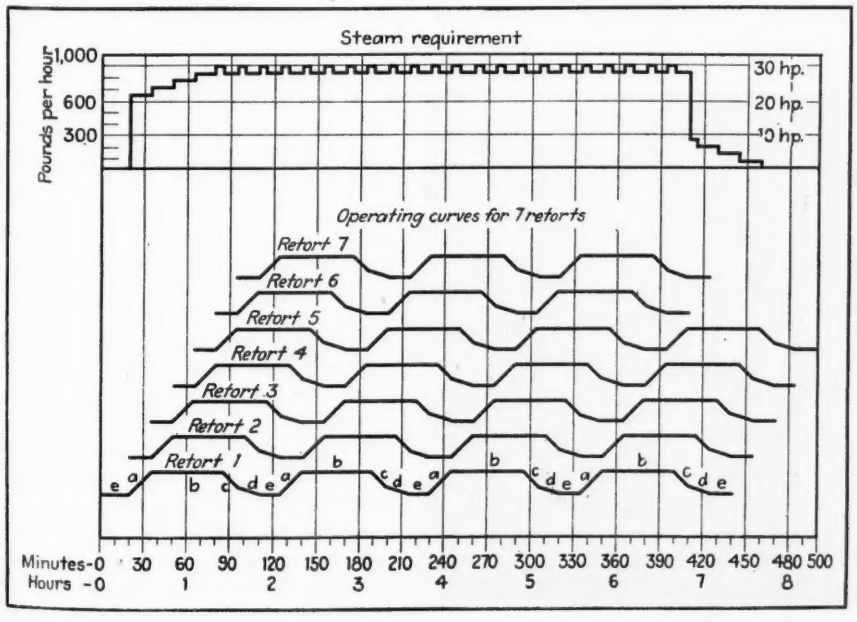


FIG. 2. Operational chart showing effect of staggered retort operation on steam requirements.

Process:

Loading	5 min.
Coming-up	15 min.
Process	50 min.
Blowdown	10 min.
Cooling	15 min.
Unloading	10 min.
	105 min.

Retort:

Sterilization temperature, $e_s = 240$°F.

Type, 40x72-in. vertical, pressure, noninsulated.

Capacity, 3 crates of 356 cans = 1,068 cans.

Weight, $W_1 = 2{,}200$ lb.

Specific heat, $c_{v1} = 0.127$ B.t.u./lb./°F.

Surface, $S = 85$ sq. ft.

Heat loss coefficient, $k = 0.04$ B.t.u./sq. ft./min./°F.

Steam:

Incoming: dry at 22 p.s.i., or 37 p.s.i. abs.
262°F., enthalpy 1,168 B.t.u.

Outgoing: wet condensate at 14.7 p.s.i. abs.
212°F., enthalpy 180 B.t.u.

Heat liberated: 1,168 — 180 = 988 B.t.u./lb. live steam.

Operational Computations

Work one shift of 8 hr. ..... $= 60 \times 8 = 480$ min.

Time of last retort ..... 105 min.

Time left for coming-up .... 375 min.

Output of sealing machine:

$$\frac{28{,}000 \text{ cans}}{375 \text{ min.}} = 74.5 \text{ cans/min.; say } 75$$

Filling time of one retort:

$$\frac{1{,}068 \text{ cans}}{75 \text{ cans/min.}} = 14.3 \text{ min.}$$

Number of sterilizations per 8-hr. shift:

$$\frac{28{,}000 \text{ cans/day}}{1{,}068 \text{ cans/retort}} = 26$$

Number of retorts required:

$$\frac{28{,}000 \times 105}{1{,}068 \times 375} = 7$$

Heat Computation

Heating cycle:

1. Heating the sterilizing retort:
$t_{i1} = 95$°F.
$Q_1 = W_1 \times c_{v1} \times (t_s - t_{i1}) = 2{,}200 \times 0.127 \times (240 - 95) = 40{,}600$ B.t.u.

2. Heating the crates:
$W_2 = 3$ at 168 lb. = 500 lb.
$t_{i2} = 68$°F.
$Q_2 = W_2 \times c_{v2} \times (t_s - t_{i2}) = 500 \times 0.127 \times (240 - 68) = 10{,}900$ B.t.u.

3. Heating the cans:
$W_3 = 1{,}068$ at 0.25 = 267 lb.
$t_{i3} = 105$°F.
$Q_3 = W_3 \times c_{v3} \times (t_s - t_{i3}) = 267 \times 0.127 \times (240 - 105) = 4{,}600$ B.t.u.

(*Turn to page* 200)

Dairy Improves Its Personnel By On-the-Job Education

Practically all types of employees given the opportunity to increase their knowledge and improve their value to company while carrying on their jobs. Educational program set up in cooperation with universities and colleges

By MARIJEAN HUTCHISON, Editorial Assistant, "Food Industries," Chicago

IF plans for postwar improvements are to be put into effect, there must be an adequate supply of trained or experienced personnel to man the plants, operate the equipment and supervise procedures. An example of a way to produce this type of personnel is found in the employee-building program of Bowman Dairy Co., Chicago.

Initiated last fall, this program provides both long-range education and short-range courses. Participation is voluntary, the company merely affording the opportunity. Nor is it a paternalistic plan, since the employees select the subjects and pay their own tuition. But before employees register for a course, they are interviewed by the personnel relations committee so that their desires may be determined and the most suitable schedule of courses set up. The employee's particular interests and plans for the future are prime considerations.

In Bowman's long-range plan, employees may attend any accredited school, college or university to receive instruction in courses applicable to their present position or in preparation for future advancement. The courses are not necessarily technical, but should be connected in some way with the dairy industry or business procedure.

The colleges and universities that the employees are attending include:

North Park College
Lake Forest College
Loyola University
De Paul University
Northwestern University
The University of Chicago
University College
Central Y.M.C.A.
Gregg School
Chicago School of Expression

The proportion of the employees participating in the program is 1.5 percent. There were 66 registrants at the various colleges and universities in April, and 58 were finishing the first semester. Out of the total of 66 students, 32 were enrolled at Northwestern University. Eight students were carrying two courses. Students were studying such subjects as:

Cost accounting
Advertising
Marketing
Business organization
Business law
Psychology
Statistics
Vocabulary building
English
Economics
Personnel management
Physics
Industrial relations
Industrial management
Executive speech
Journalism
Sales administration
Purchasing
Salesmanship
Federal taxation

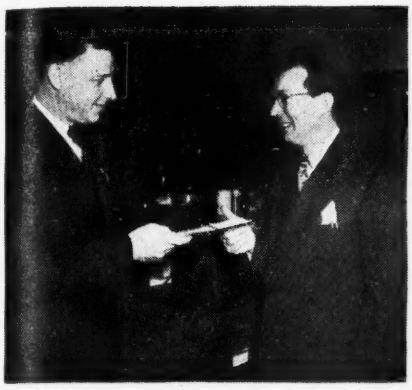
A maximum of four semester hours can be taken at one time, but the employee is cautioned against letting these courses interfere with his day-time job. In some instances, however, the committee makes special concessions for those who find it necessary to adjust their working hours to take advantage of this schooling.

Although the students pay the normal tuition and fees for their courses, a special incentive to obtain good grades is offered. The company reimburses the student for tuition paid on the basis of 100 percent for a grade of "A," 85 percent for a grade of "B" and 75 percent for a grade of "C." There is no reimbursement for textbooks, but in many of the courses the purchase of a book is optional. Bowman's library has quite a few technical books and much reference material concerning the dairy industry.

In a letter accompanying the reimbursement check, the president of the company encourages the employee to continue his education in this manner, with completion of a four-year course and the attainment of a college degree.

The short-range course of training is available to all interested employees. At the start, it consists of a 16-week course in principles of dairy technology. For this course, special arrangements have been

Originally planned for 100 students, the 16-week course in principles of dairy technology requires classroom facilities for more than 365.



As a reward for good scholarship, laboratory technician Don King receives a tuition reimbursement check from V. C. Christiansen, laboratory manager.

made with the Extension Department of the University of Illinois.

Originally, the course was set up to handle 100 students, which the University required as a minimum, but which Bowman and the University thought would be in excess of the number interested. By the time the first sessions were held, however, enrollment was so large that the decision was made—even before a class met—to give the course again next fall. And the course was made a prerequisite to college credit courses to be subsequently arranged for—such as dairy chemistry or dairy bacteriology. Already an overwhelming majority of the registered students has expressed a desire to take more advanced courses on milk processing subjects.

Since the subject matter of the courses planned so far has been fairly broad, and because the employees have indicated great interest in the courses and in obtaining information on more specialized subjects relating to milk technology, plans are under way to break the courses up into subsections to be given simultaneously. Giving consideration to the expressed wishes of the students, eight-week courses on such subjects as production, producer problems, animals (breeding, characteristics), plant requirements and management, and plant machinery are being planned.

Six sessions at different hours and different days are given to accommodate all interested employees. The classes meet Monday at 6:00 and 8:00 p.m., Tuesday at 2:00 and 7:00 p.m. and Wednesday at 6:00 and 8:00 p.m. Classes that began February 12 and 13 were being held at the John Marshall Law School.

As an indication of the broad interest in this course, the attendance for the first evening class was over 365, including production men, all of the plant managers, supervisors, laboratory technicians, distributing station employees, route salesmen, secretaries to company executives, and a very large percentage of the company managers. Of the total enrollment, 79 are employees in the plants and 283 engaged in the sales divisions of the company.

The course consists of 90-minute lectures on subjects such as the composition of milk and its physical properties, laboratory technics for determining bacterial count, fat and total solids content, milk and cream standardization, and various methods of manufacture of milk products to be given by members of the faculty of the School of Dairy Manufactures, University of Illinois. The University Extension Department engaged Dr. Ernest O. Herreid, formerly professor of Dairy Manufactures from the Vermont Agricultural College, specifically to give lectures in this course. Dr. Paul H. Tracy, head of the School of Dairy Manufactures, Dr. R. V. Hussong, Dr. W. W. Yapp and other University of Illinois men are among the lecturers. The course also includes lectures on dairy arithmetic, milk plant costs and merchandising.

The students are given a working notebook with printed material on the lectures, including the historical development of the dairy industry, statistical information related to the development of the market milk industry, and a wide range of practical problems in dairy arithmetic. Books on dairy manufacture are suggested as good supplementary reading material for the course, although not a requirement. Bowman is making these books available to the members of the class. The company is also supplying each plant manager with a copy of one of the reference books used in this course for practical reference purposes.

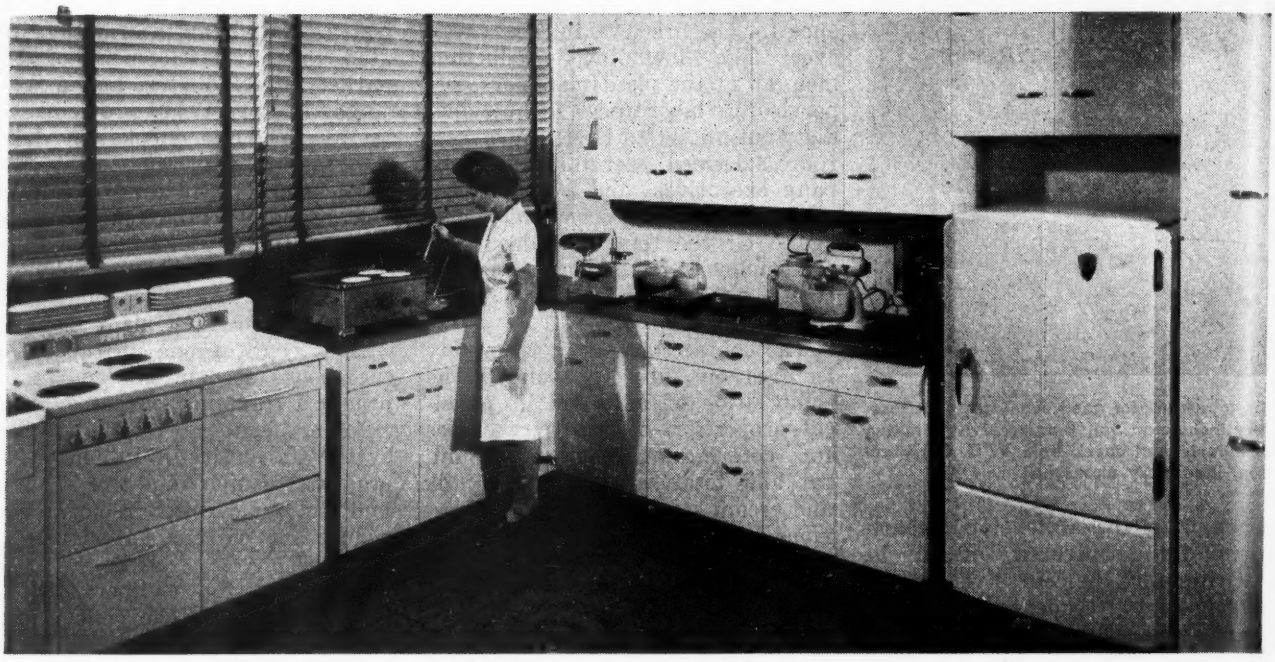
A certificate of merit is given by the University of Illinois to the students completing this course, and the same reimbursement procedure as outlined previously is followed.

The plan for a liberal education, at high school or college level, for the employee who wishes to improve and advance himself is the keystone of the Bowman program.

It Pays Dividends

The dairy company's broad, yet personalized, educational program tends to make employees more satisfied with their jobs. Absenteeism and changing of jobs has already shown a downward trend. What's more, there is an increased interest in the particular job at hand, since the employee better understands the technical importance of the job and of the industry as a whole.

River Forest, Ill., bottling and pasteurizing plant of Bowman Dairy Co., one of the largest fluid milk plants in the world. Employees in this plant are being better qualified for their present and future jobs through the company's educational program.



"How does it work in the consumer's kitchen?" is the final technological test put on a food product intended for mass marketing.

WHAT TECHNOLOGY MEANS To Cereal Processors*

PART II—There is need for improvement in processes, flavor development and keeping quality, for the development of new products and for assistance to the sales, public relations and legal departments. Technology is the answer

By F. N. PETERS, Director of Research, The Quaker Oats Co., Chicago, Ill.

CANADIAN millers have given much thought to the need for improvement in flour milling. Because their government prohibited the addition of synthetic vitamins to flour, they were forced to produce a relatively high-vitamin flour by milling processes alone. The results have been unsatisfactory, but that should not deter the technologist from continued efforts in this direction. The Morris Mills and Earle wheat peeling processes were attempts to obtain high-vitamin flours and good baking qualities without the addition of synthetics.

Huzenlaub (U. S. Patent Nos. 2,287,737 and 2,358,250) has developed a process for making white rice into which some of the vitamins originally present in the bran have been transported. His "converted" rice is an excellent product, but attempts to adapt the process to wheat have been unsuccessful.

The degermination of corn is another example of a milling process badly in need of improvement. The object is to remove the germ and bran and leave the rest of the grain in the form of grits suitable for making corn flakes. If we wished to remove paper from a wall, we could grind the plaster and float off the paper with an aspirator. However, the remaining plaster is not very effective as a wall. A corn degerminator may not be quite this bad, but it does a poor job of separating germ from grits and produces a lot of undesirable corn flour.

Ready-to-eat cereals either are cooked in rotating drums or stationary autoclaves or exploded from guns under high steam pressure. Almost without exception, these processes are carried out batch-wise. The modern macaroni plant uses a machine which mixes the flour and water, kneads the dough and extrudes it continuously. Some day a similar continuous operation will be applied to cereal cooking processes.

But much worse than this is the effect that these cooking processes have upon the nutritional quality of the cereals. Some of the thiamine is destroyed, niacin and riboflavin are often washed away, and the protein quality is seriously impaired. The protein in wheat

*Based upon a paper read before the March, 1945, meeting of the Chicago Section, Institute of Food Technologists.

flakes and puffed wheat has only a minor fraction of the growth-promoting value of the original protein. In some way, this loss should be stopped. Predigestion with enzymes, lessened cooking temperatures and times have been suggested. Theoretically it is possible to enrich cereals with synthetic amino acids to overcome protein deficiencies, but why spoil the protein in the first place? True, we know of nothing better today. But until something practical is done about it, the ready-to-eat cereals will be nutritionally inferior to the whole grain, so-called "hot cereals."

Flavor Problem

Flavor is the most important quality of any cereal. Have we exhausted the possibilities of flavor development? Toasted bread, wheat flakes, shredded wheat biscuits and puffed wheat are all wheat products, but each has a different flavor. Is this really a difference in flavor or is it texture? The two are so closely related that it is difficult to discuss one without the other. But if we are interested in flavor, how can we expect to retain any of the delicate flavors and fugitive aromas in a product which is pressure cooked with steam, dried, flaked and finally toasted? In the preparation of ready-to-eat cereals, almost everything is done to remove flavor rather than to retain it. It is not surprising that these products are sometimes referred to as "hay."

Along this same line is the matter of keeping quality. Wheat flakes, corn flakes, granulated wheat, graham flour, shredded wheat biscuits and even puffed rice become rancid. Proper control of the moisture content as the product leaves the oven, precaution against copper contamination and the use of low-fat cereals all contribute to the reduction of the amount of rancidity. But the problem still exists. The use of an oat-flour and antioxidant and packaging in oat-flour-treated cartons are helpful in some cases, but the food technologist has a lot of room for development in this field.

Quick-Cooking Barley?

Ready-to-eat cereals are products of the 20th Century, and they have made serious inroads on the older types of hot cereals. However, quick-cooking oatmeal was developed, and immediately the sale of oats increased. Now an instant oatmeal is on the market. What has been done with oats can be done with corn and wheat. Barley is not in many kitchens. Is this because it takes an hour or longer to cook or because of its flavor? If a food technologist made a quick-cooking barley, would people eat it?

Pancake mixes have been available for years, and now there are mixes for making pie crust, gingerbread, cake, corn muffins, ice cream, and biscuits. These were developed by technologists—and the end has not been reached.

Good salesmen must know their products as well as their competitor's and be able to discuss their strong and weak points. Most cereal salesmen appreciate practical scientific information about vitamins, protein quality, cooking technics, and the like. If there is a nutrition story, no matter how technical it may be, the good technologist can put it into language that the salesmen can understand. Cooperation between salesmen and technologists is a great morale builder for both.

Many people are curious about what they eat. These are the ones who ask whether the cereal contains salt, how much bran it has, if it furnishes iron, calcium or the anti-gray hair vitamin? Inquiries and complaints regarding behavior of the product can be handled in such a way as to create friendship for the company and confidence in its products. All of these inquiries should be handled by a technologist.

The cereal advertising of the past decade, or even longer, has been based in large measure on processes or facts developed by food technologists. The irradiation of cereals to produce the "sunshine vitamin," the story that whole-grain cereals are rich in thiamine, and now the cereal protein advertising: All these programs are based upon scientific evidence which was first interpreted to advertising departments by food technologists. Even catch phrases such as the "Vitamin Rain Process" for enriching puffed wheat and "Thiamine—the Spark Plug Vitamin" are brain children of food technologists. Whether the excesses to which this advertising may have been carried are the fault of the technologist is debatable, but this question serves to emphasize the next point; namely, the food technologist has the responsibility of making sure his company's advertising is truthful. This is very difficult at times, not because the agency is fundamentally dishonest, but because of lack of knowledge. To the advertising man, a statement that "This cereal contains all the important vitamins" may appear correct, since the product does contain thiamine, niacin, and riboflavin. He never heard of any more and assumes there are but these three. Or take the case of the agency which wrote a beautiful advertisement about a product containing vitamin D. It did have vitamin D, but to the extent of two units per ounce—which meant that a day's supply of the vitamin could be obtained by eating 12½

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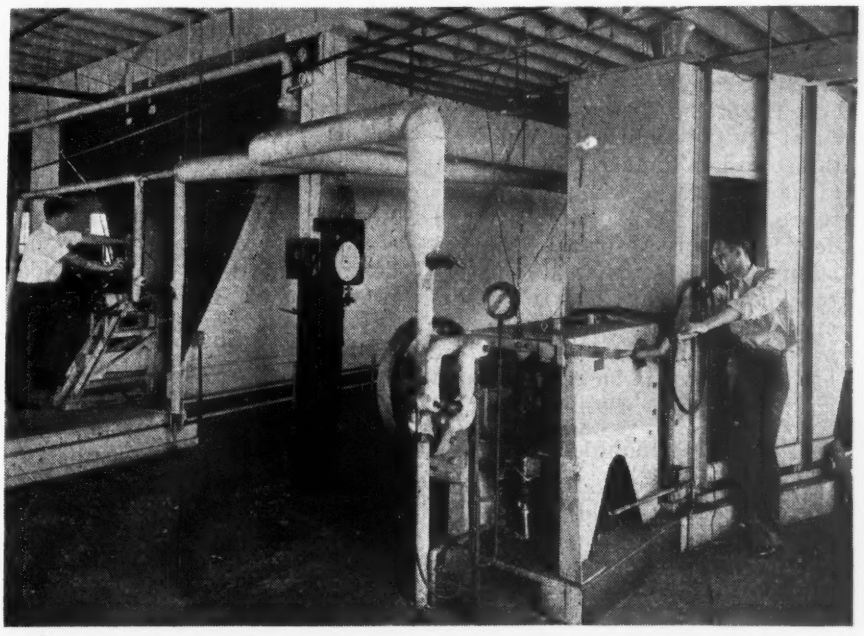


Successful commercial-plant production often depends upon the proper engineering of the processing equipment as a result of pilot-plant studies.

18 MISTAKES IN THE USE OF LECITHIN

PART II—Errors made in using lecithin in cooking oils, lard, shortening, margarine, mayonnaise, peanut butter, sherbets and ice cream mixes are discussed. A table shows how it should be employed, and why, in 32 items

By L. RUSSELL COOK, Vice-President,
W. A. Cleary Corp., New Brunswick, N. J.

12. When it is desirable to employ lecithin as an antioxidant in frying and cooking oils for potato chips, doughnuts, french fries, and so forth, no more than 0.2 percent lecithin should be used. The use of 0.1 percent is even better if sufficient antioxidant protection is obtained.

Overuse in this application will result in greatly increased penetration of the cooking fat into the article being treated. Lowered interfacial tension, which is beneficial within the internal structure of the dough, is definitely to be avoided in cooking fats.

Fatty Foods

13. When lecithin is added in the manufacture of lard, shortening, margarine, oleo oils, hard butter, and so forth, the mistake is often made of permitting the fat to be too hot, either at, or subsequent to, the time of lecithin addition. The elevated temperature then causes an undesirable darkening to take place. The cooler the bulk fat at the time of, and subsequent to, the addition of the lecithin, the less danger there will be of darkening. Maximum temperatures should be 150 deg. F.; 130 deg. F. is more desirable. Time is as much of a factor as is temperature, however, so if higher temperatures are necessary for one reason or another, the duration of the high temperature should be shortened as much as possible.

Mayonnaise

14. The use of lecithin in mayonnaise would seem to be a natural application. The fact, however, that the egg yolk used already contains a high percentage of lecithin—and the fact that in this product the egg yolk forms a major portion of the emulsion nucleus—precludes the successful use of additional lecithin. When added, lecithin spreads the nucleus so thin that its membrane strength is reduced to the point of breakage and the emulsion collapses.

Only when the quantity of egg yolk is reduced, and a combination of lecithin and protein substituted, will the use of additional lecithin be successful. Even this will not produce as good a mayonnaise as full employment of egg yolk.

Peanut Butter

15. Lecithin is frequently used in peanut butter to provide antioxidant protection and to soften the consistency of the butter. Lecithin will do both of these things, and where the peanut butter is to be used within a relatively short time for commercial sandwich or confectionery purposes, nothing more needs to be said.

When, however, the application is to peanut butter made for retail distribution, the reduced viscosity of the butter will aggravate oil separation. In this case, therefore, the use of the lecithin should be accompanied by the addition of from 3 percent to 5 percent of flour (soya, wheat, rye). The flour added will prevent separation without destroying either the antioxidant protection or the soft consistency.

Sherbets

16. In sherbets and relatively low-solids ice cream, where functioning at water-solids interfaces is the objective, applications have frequently been unsuccessful because the usual type of lecithin was merely added to the batch in the pasteurizer. The time of addition is correct, but either a water dispersible lecithin must be used, or, if the fat-soluble type is employed, it must be premixed with about ten times its weight of sugar. This admixture with sugar permits absorption of the oil and exposure of the polar group of the lecithin molecule.

Ice Cream Mixes

17. In some products—such as ice cream mixes, gravies and certain types of suspension-emulsion combinations—it is necessary either to have the lecithin operate at water-solids interfaces or to approach water-fat interfaces from the aqueous phase. Where this is the case, it is an error to attempt to use the more usual type of lecithin where the phosphatides are dissolved in or suspended in the oil carrier. In such types, the polar group is not exposed, and the solution in water is difficult.

The type of lecithin required for such applications is a water-dispersible type in which the polar group is exposed and can carry the lecithin into an aqueous medium.

Storing Lecithin

18. The mistakes made in the handling of bulk lecithin usually result from the opinion that special care is needed for preservation. None is needed.

Storing lecithin in refrigerated rooms will cause the lecithin to harden, making it difficult to handle and reducing speed of effectiveness when used. Likewise, reduced temperatures may cause some oil separation, leaving pockets of oil on the surface and spotted through the mass.

Storing lecithin in hot rooms or against radiators is likewise to be avoided. Elevated temperatures, if prolonged, will cause darkening and burning.

Temperatures of anywhere from 70 to 100 deg. F. are quite safe for lecithin-storage purposes.

Directions for Using Lecithin and Effects on Product Characteristics and Quality

ITEM	Quantity to use	Time of addition	Dough, batter, batch condition	Machinability or handling quality	Viscosity	Gloss	Texture	Grain	Color	Separation	Dispersion
1. Biscuits, hard cookies	2% of fat	In mixer with fat or	Paste more	Less sticky, close							

Directions for Using Lecithin and Effects on Product Characteristics and Quality

ITEM	Quantity to use	Time of addition	Dough, batter, batch condition	Machinability or handling quality	Viscosity	Gloss	Texture	Grain	Color	Separation	Dispersion
1. Biscuits, hard cookies, ice box cookies	2% of fat	In mixer with fat or after flour cleared in	Drier, more pliable	Less sticky, clean mold or deposit		Slight	More tender		More uniform		Improved; checking reduced
2. Bread, rolls and sweet goods	2-3 oz. per 100 lb. flour	With shortening	Drier dough, more resilient	Less sticky			More silky crumb; more tender crust	More uniform	Of crust, more uniform		
3. Brittles	1% of fat	Direct to batch following fat					More tender			Retards separation	
4. Cakes (emulsified shortening)	1% of shortening	After obtaining full vol. in batter	More fluid	Cleaner deposit, lays flat in pans			More silky	More uniform	Of crust, more uniform		
5. Cakes (regular fats)	1-1¾% of shortening	After obtaining full vol. in batter	More fluid	Cleaner deposit, lays flat in pans			More silky	More uniform	Of crust, more uniform		
6. Caramels, nougats, toffees	1% fat	Direct to batch following fat		Less sticky			More tender, less sticky			Retards fat separation	
7. Chocolate	0.25-0.3%	Prior to tempering			Lowered	Improved					
8. Chocolate flavor for ice cream	0.25%	Prior to molding	Softer	Easier molding	Lowered						More rapid & complete in mix
9. Cookies (molasses)	4% of fat	In mixer with fat or after flour cleared in		Less sticky, clear cut		Slight	More tender	More uniform	More uniform		
10. Cookies (soft)	2% fat	In mixer with fat or after flour cleared in	More pliable	Clear cut, less sticky			More silky	More uniform	More uniform		
11. Doughnuts (cake type)	2% of fat	With fats		Clean deposit			Softer	More uniform	More uniform		
12. Doughnuts (raised)	2% of fat	With fats		Clean deposit			Softer		More uniform		
13. Dry mixes (various, prepared)	*(See individual products)*	With fats									Improved
14. Fat-bearing chocolate sirups and toppings	1% of fat	Premix in fat-containing constituents			Variable	Improved	Smoother			Retards fat separation	
15. Flavors (emulsions)	1-10% of oils	In oils		Rapid dispersion in product reduces flash evap. loss	Raised		Smoother			Reduced	More rapid in product; on consumer's taste buds
16. Flavors (oils)	1%	Unimportant		*(See above)*							*(See above)*
17. Gravies and sauces	1-2% of fats	Variable			Variable		Smoother			Reduced	
18. Hot chocolate and other powdered drinks	0.5-1.0% total dry weight	Before dehydration or before pulverizing or sifting									More rapid & complete in reconstitution
19. Ice creams (low solids) and sherbets	0.15%	Premixed with portion of sugar	Body less watery				Smoother	Less grit		Of air reduced	
20. Ice cream coatings	0.5%	Just prior to tempering			Lowered; maintained	Improved					
21. Icings and fillings of fat and suspended solids	1% of fat	Unimportant	Softer	More pliable	Lowered if no fat omitted	Improved	Smoother				
22. Icings of fat, moisture and solids	1% of fat	After obtaining full vol.	Softer	More pliable	Variable	Improved	Smoother				
23. Lard	0.1-0.25%	When under 150° F. and before Votating	Slightly softer							Slight improvement	More rapid and uniform
24. Meats (canned with gravy)	1-2% of fat	Variable					Gravy smoother			Of fat reduced	
25. Oleomargarine	0.1-0.75%	In fats		Reduces spattering					Slight tint with high %'s	Reduced weeping	More rapid and more uniform
26. Pan greases and slab grease (straight)	1% of fat	Before use			No change						More efficient coverage
27. Pan grease with suspended solids	1% of fat	When mixing	More fluid	Easier application	Lowered	Unimportant	Smoother			Slightly reduced	More efficient coverage
28. Peanut butter for commercial use	0.5%	After grinding	Softer	Easier deposit, brkg. reduced	Lowered	Unimportant	Smoother			Unimportant	Improved
29. Peanut butter for retail sale	0.5%	After grinding	Softer	Improved	Lowered	Slight	Smoother			Greater; correctable with solids	
30. Pie doughs	2% of fat	With shortening		Mixing time must be reduced			More flaky		More uniform		Fat in thinner layers
31. Shortening	0.25%	When under 150° F. and before Votating	Slightly softer								More rapid and uniform
32. Soda crackers	2-3 oz. per 100 lb. flour	With shortening	Drier dough	Less sticky			More tender	More uniform	More uniform		

ADDENDA: (1) Lecithin does not save fat except in items 7, 20 21, and 27. (2) It prolongs shelf life by inhibiting oxidation and by moisture retention. (3) It increases fermentation tolerance of 2 and 12.

The Sun-Lite Bakery, owned by Penn Fruit Co., Philadelphia, has used the gate, as shown above, for four years on three of its trucks in the distribution of bakery products to its local stores, where final delivery has to be made across sidewalks.

Elevating Tailgate Speeds Deliveries

Unloading of food products can be accomplished more rapidly and with less damage by low-cost device available for trucks and trailers

BECAUSE it eliminates lifting and damage due to goods dropping from the rear ends of motor trucks, the elevating tailgate speeds up and reduces the cost of distributing food products that have to be delivered across sidewalks. The tailgate fills a long-felt need on on the trucks of wholesale grocers and bakers. These vehicles are generally loaded from platforms at warehouses and bakeries, but have to make deliveries across sidewalks to retail stores.

The elevating tailgate replaces the ordinary tailgate of the truck or trailer. By power taken from the truck or tractor engine, it is lowered from a horizontal position, level with the truck floor, to the ground with the goods to be delivered, then returned empty to its original position.

Heavy cases of groceries or other food products are thus lowered to the ground without lifting by the truck driver or helper, and without danger of dropping on the sidewalk. Small cases may be stacked on a hand truck on the tailgate before it is lowered and then rolled off into the store after the gate is lowered to the sidewalk. Therein lies the economy of the gate, for the goods can be rolled into the store much faster on the hand truck than they can be carried in piecemeal in the arms or over the shoulder of truck driver or helper.

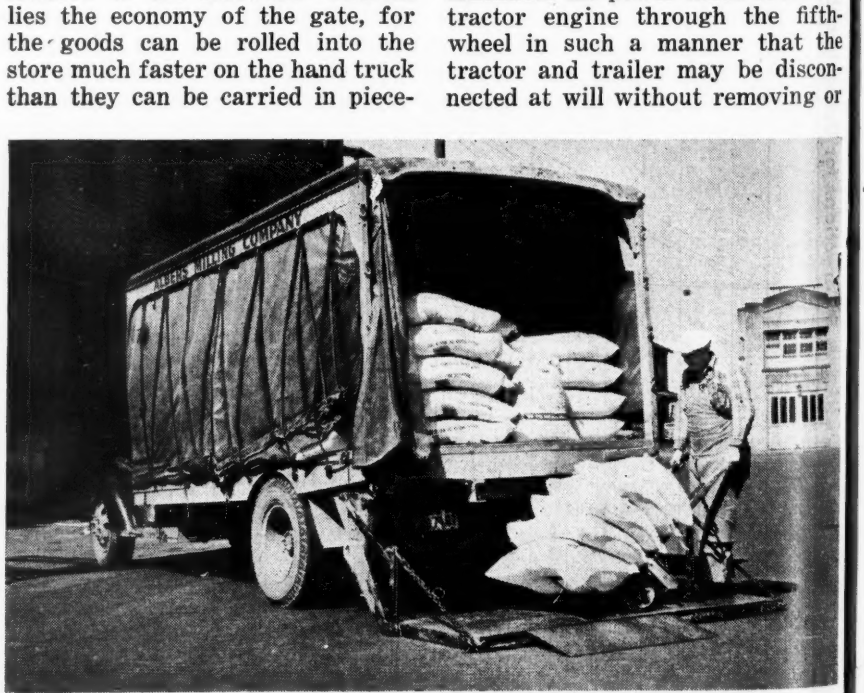
While elevating tailgates have been used occasionally for many years, it remained for a large manufacturing company with national sales distribution, Fruehauf Trailer Co., Detroit, to offer a standardized model that can be fitted to all makes of trucks and trailers.

What It Costs

The Fruehauf tailgate for straight trucks is listed at $590 delivered to the customer. This price includes freight and federal excise tax. The cost of installation varies from $75 to $125, depending upon the amount of work required for different trucks, so that the total cost of the equipment installed varies from $665 to $715. The installation may be made at a Fruehauf factory branch or by a local truck body builder or repair shop from blueprints furnished by Fruehauf.

When the tailgate is installed on a semi-trailer, some means must be provided to get the power to operate it on the trailer itself. While this might be done by mounting a small independent gasoline engine on the trailer, similar to those installed for operating trailer refrigeration systems, the Fruehauf company offers a less-complicated means in the form of a power fifth-wheel.

As shown in the accompanying illustrations, the power fifth-wheel transmits the power taken from the tractor engine through the fifth-wheel in such a manner that the tractor and trailer may be disconnected at will without removing or



This is how five unwieldy bags of flour can be unloaded at once, instead of one at a time over the shoulder of the driver. The bags are being delivered by the Albers Milling Co., Seattle, from one of their canvas-sided trucks.

An actual installation of an elevating tailgate on a semi-trailer, which can be disconnected from the tractor at will. This unit is used by the Loose-Wiles Biscuit Co. The closed position is shown at the left and the open, partly lowered position at the right.

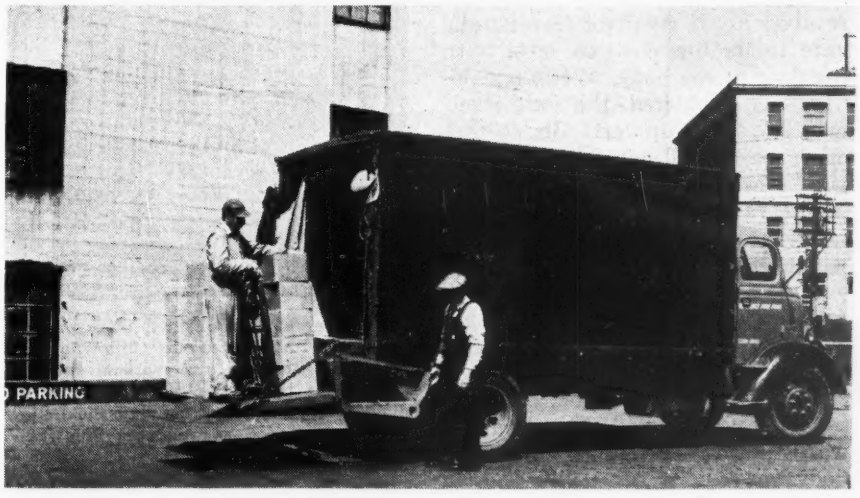
disturbing any of the tailgate mechanism. The Fruehauf power fifth-wheel used in place of the ordinary fifth-wheel is listed at $225 for a 30-in. wheel and $265 for a 36-in. wheel. Installation charges for either size are approximately $150.

Power Fifth-Wheel

Because of the necessity of separating the upper and lower halves of the fifth-wheel to disconnect the trailer from the tractor, the method of transmitting the power through the fifth-wheel is quite ingenious. This is done, as shown in one of the accompanying drawings, by means of two parallel vertical shafts and meshing spur gears. One shaft extends down through the hollow kingpin, which stays with the upper half of the fifth-wheel attached to the trailer. A gear at the bottom of this shaft meshes with another on the top of the second shaft, extending upward through the lower half of the fifth-wheel which stays with the tractor.

The tailgate itself is the same for both trucks and trailers. The only difference is the means of getting the power from the vehicle engine to the pump which actuates the tailgate. In straight trucks, the power is taken direct from the engine through a power take-off on the truck transmission. On trailers, the power is taken off the tractor transmission in the same manner, but is then passed through the power fifth-wheel as previously described.

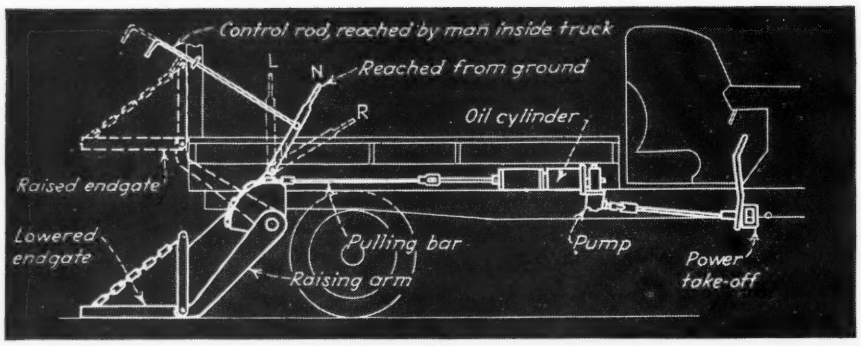
The tailgate equipment consists of the tailgate proper, fastened to a pivoted quadrant mounted under vehicle frame near the rear end, and a connecting pulling bar joined to the piston of a hydraulic cylinder operated by a pump driven from the power take-off. The gate is 3-in. thick, 36 in. wide and varies in length to fit width of body.



The helper at the right is seen here lowering the tailgate with a load of groceries. The load has already been stacked on a hand truck and is ready for final delivery to a warehouse from a truck owned by the National Grocery Co., Seattle.

Cartons of cans of coffee are being unloaded by a hand truck from the lowered tailgate, installed on a rack truck, owned by the Folger Brothers Coffee Co., Seattle. When raised, the gate is swung vertically upward to protect the goods in transit.

The tailgate has a capacity of one ton. Each unit is equipped with a safety release valve which bypasses the oil in the cylinder so that the gate will not operate until the overload is removed.



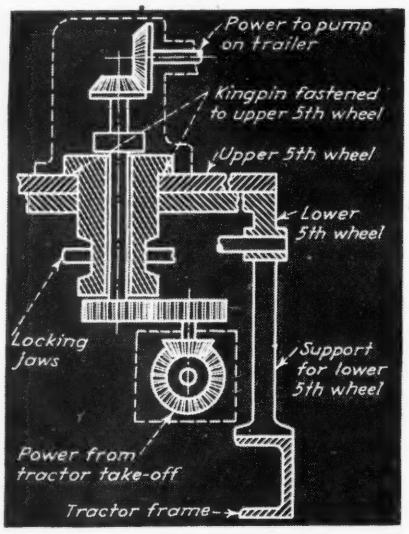
This diagrammatic installation of the elevating tailgate shows the power takeoff from the truck's engine, the location of the oil cylinder and its pumps, the pulling bar, the raised and lowered positions of the tailgate and the location of the control levers.

In operation, the pump passes the oil from one side of the piston in the cylinder to the other. In one direction, the piston movement permits the gate to be lowered to its horizontal position on the ground. In the other direction, the piston pulls the pulling bar, attached to the top of the quadrant, so that it revolves about its pivot to raise the gate to its top position level with the floor of the body. When one delivery is completed, the gate itself may be turned up vertically so that other goods will not fall out of the body while the truck is in transit.

The raising and lowering of the tailgate is controlled by a lever, which may be mounted inside or outside the body, near the rear end. The preferable mounting is on the outside of the body near the rear, so that it can be reached by a man standing on the ground, while a separate control rod extending upward to the rear vertical end of the body may be reached by a man standing inside the body.

Proved by Experience

The Sun-Lite Bakery, one of whose trucks is shown in an accompanying illustration, has used the elevating tailgates on three of its trucks for the past four years. Bread, pies, cakes, buns and rolls are loaded into fiber cases mounted on casters and rolled across the plant platform into the truck body. Deliveries are made to the company's retail stores, where the cases are lowered to the sidewalk, without lifting or dropping, by means of the tailgate. Twenty-four of the fiber cases are carried in the truck body at one time.



The power is transmitted through the disconnecting halves of the fifth-wheel by meshing gears on two vertical, parallel shafts, one below the fifth-wheel and the other extending down through the hollow kingpin, fastened to the upper fifth-wheel.

The Sun-Lite tailgate installation was made by a local Philadelphia body builder at a total cost of about $600. The owner states that the equipment has proved satisfactory in every respect.

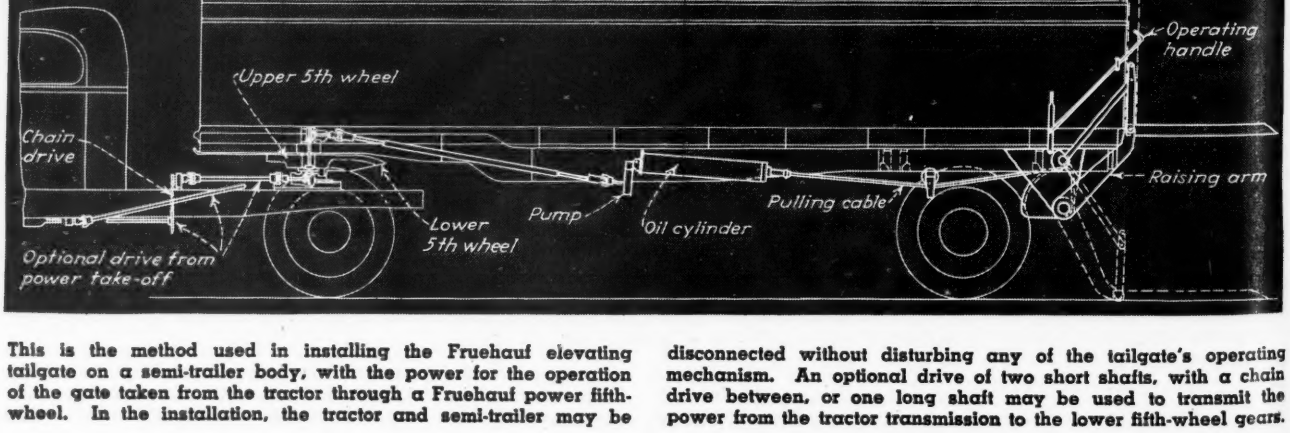
The tractor-trailer elevating tailgate installation has been used by the Loose-Wiles Biscuit Co., Long Island City, for over 5 years. It is used to transport packaged bakery goods from Long Island City to branches in the metropolitan area which have no loading platforms.

National Grocery Co., Seattle, had used the elevating tailgate on one truck since 1937 in hauling to the docks. Installed at a cost of $455.30, it effects a time saving of about one-third in handling heavy commodities.

Albers Milling Co., Seattle, had the elevating tailgate installed in 1937 at a cost of $750. At that time the company was hauling cod liver oil from the docks in 55-gal. drums, and it took three men two hours to load 24 drums. With the lift, 27 drums were loaded by two men in 1½ hours. The lift paid for itself in six weeks.

The company also hauls products in 100-lb. sacks to dealers who are at sidewalk level. With the tailgate, the dumps can be picked up and trucked directly into the stores. Three trips per day can be made with 7½-ton loads, where only two are possible with a conventional truck. Also, fewer sacks are torn.

At the Albers mill, heavy equipment can be taken to a repair shop with the aid of the lift, saving the cost of hiring an outside truck.



This is the method used in installing the Fruehauf elevating tailgate on a semi-trailer body, with the power for the operation of the gate taken from the tractor through a Fruehauf power fifth-wheel. In the installation, the tractor and semi-trailer may be disconnected without disturbing any of the tailgate's operating mechanism. An optional drive of two short shafts, with a chain drive between, or one long shaft may be used to transmit the power from the tractor transmission to the lower fifth-wheel gears.

Sources and Characteristics of OIL of SAVORY

Savory, an aromatic member of the mint family, makes its flavor contribution to spicy sauces and to various meat products. It is used both as the herb and in the form of the steam-distilled oil

By ERNEST GUENTHER, Chief Chemist,
Fritzsche Brothers, Inc., New York, N. Y.

Summer savory growing at Burlington, Vt.

OIL OF SAVORY is a most useful and valuable ingredient in the flavoring of soups, sausages and meats. It forms an important constituent in kitchen bouquets and spicy sauces.

There exist two species of *Satureia*; namely, *S. hortensis* L. and *S. montana* L., possessing a pronounced thyme-like odor and flavor. Both are employed as culinary herbs. The oils of the two plants are closely related in chemical composition. They can be obtained by steam distillation of the flowering herb.

Summer Savory

Our "summer savory" or garden type, *Satureia hortensis* L., is generally cultivated. It is sometimes found wild, although sparingly. An annual, it is less developed than the "winter savory," *S. montana*. Its stalks are herbaceous, covered with more leaves, which are soft and linear. The branches are frequently of reddish color. The flowers are whitish, dotted with red, growing in a bouquet from the summit of the branches. The seed is sown annually in light soil, at the end of April in Northern France and the end of February or in March in Southern France. It begins to sprout after about one week or a little longer. The harvest takes place during the flowering season.

According to A. E. Slessman,[1] of Fremont, Ohio, seed should be sown in rows about 12 in. apart, ¾ lb. per acre. The seed sprouts very slowly and requires intense cultivation, also two hand weedings. Savory is ready for harvest when flowers commence to bloom.

Slessman reports a yield of about 6 tons of clover-dried plants per acre which, in turn, gives a little more than 26 lb. of oil (about 0.21 percent).

The plant material is charged into a still, live steam generated in a separate steam boiler is blown through, and the oil separated in a Florentine flask. Fresh flowering summer savory yields about 0.1 percent of oil.

The phenols which form the principal constituents of the oil and which consist mainly of carvacrol, are assayed according to the method described in the U. S. Pharmacopeia. The higher the phenol content of the oil, the higher is its specific gravity and the lower its optical rotation. The range of these properties is shown in Table I.

The chemistry of *Satureia hortensis* oil was investigated by Jahns,[5] who found that it contained the following compounds:

p-cymene—About one-third of the hydrocarbons boiled between 173 and 176 deg. C. at 760 mm. and consisted of p-cymene.

Another terpene (?)—About two-thirds of the hydrocarbons boiled between 178 and 180 deg. C. at 760 mm.; d 0.885, α_D —0 deg. 12 min., and contained a terpene which was not identified.

Carvacrol—The phenols consisted mainly of carvacrol, the principal constituent of the oil; and

Another phenol (?)—Also traces of another phenol not further investigated.

Oil of Satureia montana L.

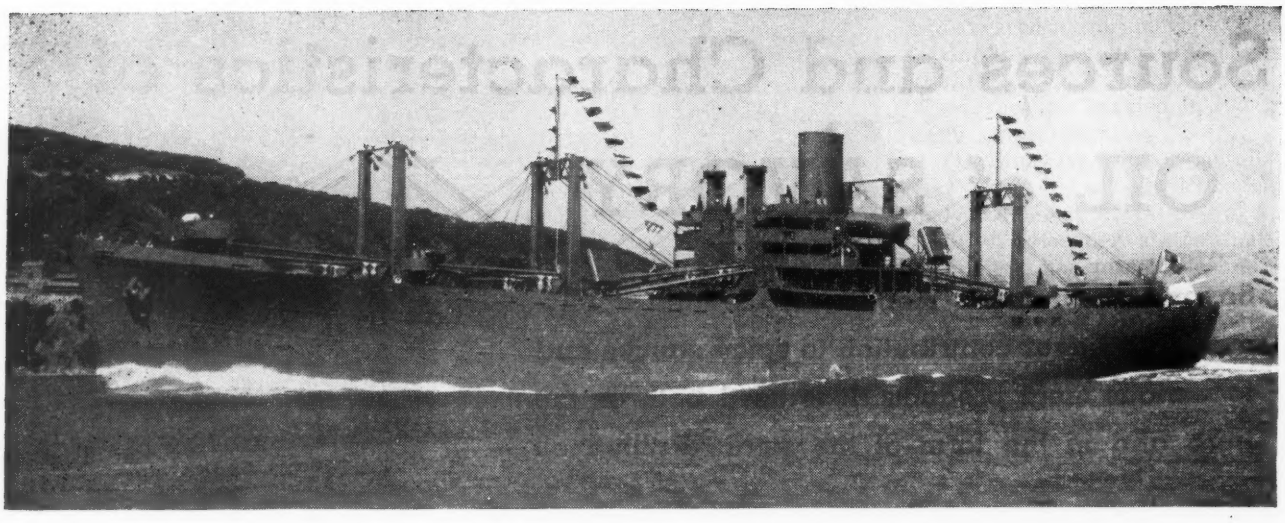
Satureia montana L., our "winter savory," or, as the French call it, *poivre d'ane*, grows spontaneously

(*Turn to page* 190)

TABLE I—Properties of Summer Savory (Satureia hortensis L.) From Various Sources.

Source of the oil— Reported by—	Limits suggested by Gildmeister and Hoffmann[2]	Calabria[a] Albricci[3]	Kazanlik[b] Schimmel & Co.[4]	Fremont, Ohio Fritsche Bros.	Dalmatia Fritsche Bros.	Dalmatia Fritsche Bros.	Dalmatia Fritsche Bros.	France[c] Guenther
Specific gravity at 15° C.	0.896 to 0.960	0.8964	0.9040	0.884 to 0.910	0.941	0.932	0.938	0.924
Optical rotation	+0°4′ to —0°56′	Inactive	—0°10′	+0°15′ to +3°40′	—2°48′	—4°24′	—3°19′	—3°0′
Refractive index at 20°C.	.....	.....	1.49307	1.4869 to 1.4955	1.5044	1.5010	1.5032	1.4941
Saponification number	.....	5.6	....	.....	....	....	....	....
Phenol content (carvacrol)	30.0 to 42.0%	31.25%	40.0%	23.8 to 42.0%	55.0%	39.0%	47.1%	31.5%
Solubility	Soluble in 2.0 vol., occasionally in 10 vol. of 80% alcohol		Soluble in 9.0 vol. and more of 80% alcohol	Soluble in 0.5 vol. and more of 90% alcohol; clear to turbid with more	Soluble in 3.0 to 3.5 vol. and more of 70% alcohol	Soluble in 1.0 to 1.5 vol. and more of 80% alcohol	Soluble in 1.5 vol. and more of 80% alcohol	Soluble in 1.0 vol. of 80% alcohol; opalescent with more

(a). Plants grown in Calabria, oil distilled by Albricci. (b). Bulgarian Experiment Station. (c). Oil distilled by the author in Seillans, Var., France.



S.S. "Great Republic," C-2 Type fully refrigerated freighter. This ship is now engaged in transporting refrigerated foodstuffs to our armed forces and allies overseas. Built at the Moore Dry Dock Co., the ship uses 500,000 bd. ft. of Fiberglass in layers of 12 in. on shell side and under main deck. Otherwise insulation consists of cork on tank tops and other areas where structural support is necessary.

New Food Ships To Aid Development of Foreign Markets

Refrigerated ships built to supply troops will provide improved transportation abroad postwar, although zero temperature still is needed for frozen foods. The facilities are described here, and the problems involved are discussed

By L. L. WESTLING, Technical Engineer, Matson Navigation Co., San Francisco, Calif.

SUCCESSFUL development of foreign markets for perishable foods postwar will depend to a great extent upon proper use of modern refrigerated ships, backed up by quality processing and careful handling to and from the ships. American ship owners have made big strides in the refinement of facilities for transporting foods, but few people appreciate the problems that confront these ship operators. Those in the food industries who look to business abroad postwar should know what transport facilities will be available, what the limitations are and what problems are involved in transocean distribution.

Types of Ships

Under the present wartime operations, the all-refrigerated ships are carrying refrigerated stores to distant central distributing points in the South Seas. At such points, the food is transferred to small refrigerated vessels similar to the familiarly known Tuna Clippers which are capable of loading over 300 tons of cargo.

These boats carry the perishables to numerous outlying points where reefer barges lie at anchor, and from which further front-line distribution is made by refrigerated truck and portable refrigerators.

The Tuna Clipper class vessels, known as the Y.P. Type, are diesel-powered boats and have been building at 15 West Coast yards. They are a trim and sturdy looking vessel and will be of great value to the seafoods trade after their present employment.

There are two types of barges or floating warehouses in this service. One has a hull of concrete with a storage capacity of 2,200 tons and has facilities for making five tons of ice and 500 gal. of ice cream per day.

A second type of barge is smaller, built of steel, and is novel in that the hull and all the fitments are forwarded by steamer in 368 labeled packages in knock-down form, assembled on the beaches and launched near their intended anchorage. They have a storage capacity of 400 tons of reefer cargo.

The extent to which such practices may be adapted to peacetime operations is problematical. But regardless of this influence, shoreside facilities will require extensive development. Tidewater refrigeration terminals will be needed to serve the all-refrigerated ship. Insulated, air-conditioned and refrigerated enclosures on the general cargo pier may be built in which perishables may be impounded while awaiting ship stowage or delivery. More rapid handling of perishables into and out of the ship is needed, together with the development of a more "robust" type of stevedore who will more willingly

work in an enclosed operating reefer space, after the manner of his warehouse counterpart.

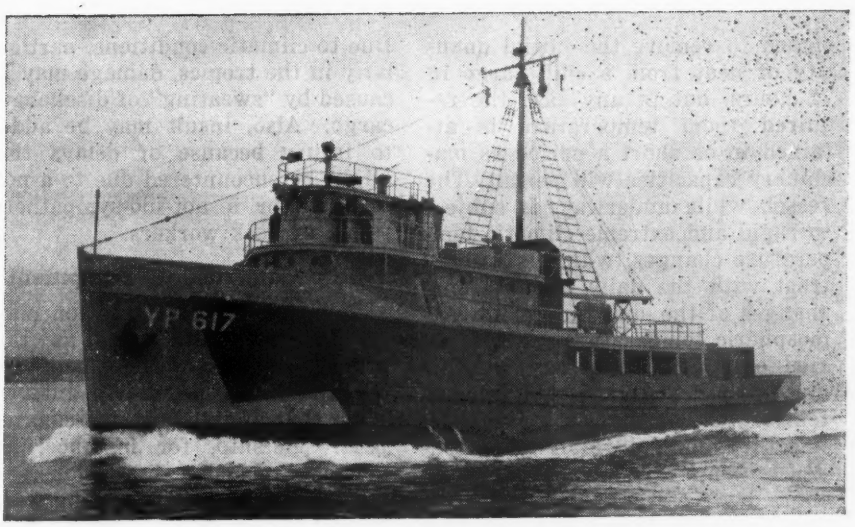
The shipment of chill cargo to offshore ports favors the fast vessel to shorten the interval of origin to consumer. A heavy shipment of this type, however, if coincidental with the arrival of other ships carrying chill cargo perishables, can flood the market and fill the cold storage warehouses where they exist. With the growth in numbers of our merchant vessels, the tendency toward smaller and frequent shipments is apparent, and marketing is increasingly better regulated. With the advent of "true quick-freeze" distribution, the speed of the vessel will be of less consequence. And by impounding these foods in warehouses close to the terminals of the port of delivery, ideal marketing conditions can be had, regardless of seasons and variable deliveries.

Problems Aboard Ship

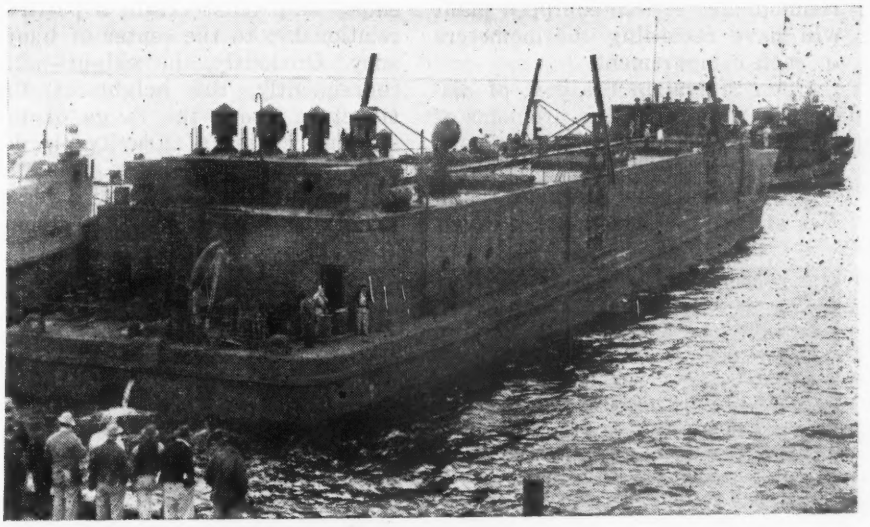
In considering the ship's responsibilities, the ship owner should be able to assume that the perishable placed in his care is of prime quality, that it is perfectly processed and packed, and has had good care in its carriage to his terminal floor. Lacking in any of these, the carrier may find that even with perfect management of his vessel, latent defects may develop while the cargo is in his hands and result in poor delivery. He tries to be watchful but he holds a delicate position in the distributing system.

The ship's officers and terminal operators have the responsibility to see that cargo is properly segregated in kind and in temperature range, that it be carefully handled and properly stowed. Unlike shoreside cold storage, the inclosed volume of a vessel is so costly that each compartment must be tightly stowed. There are no walkways or aisles, coil clearances or overhead spaces. Care should be exercised, however, to stow the tiers of cargo with dunnage and to make it possible for the air to move from the floor gratings and upwardly through the cargo. With cross-room cold-air-blast systems, dampers or ports must be so arranged and set as to insure movement of air through the cargo, without by-passing.

Assuming further that the cargo is properly stowed in a well-designed refrigerated room, the responsibility becomes a matter of operation by the engine-room personnel. The plant is usually de-



Y.P. 617 is a Tuna Clipper class vessel. Designed and built by Harbor Boat Building Co., the Y.P. boat is a refrigerated cargo type capable of carrying 300 tons of fresh and frozen food.



A "seagoing ice-box" built by Concrete Ship Constructors, of concrete, with shells 7 to 9 in. thick and with neither frames nor ribs. Hulls are 265 ft. long. One compartment on deck has equipment for making 500 gal. of ice cream daily. Below deck are eight holds. The total capacity of the refrigerated space is 1,000 tons.

Courtesy Refrigerating Engineering

Modern fire-resistant refrigeration construction on the S.S. Lurline.

signed to remove the initial quantity of heat from a chill cargo in 72 hours, but in any case the required room temperature is attained in as short a period as machinery capacities will permit. The vessel, while underway, is subject to rapid and extreme climatic temperature changes, which is in contrast with the daily and seasonal changes of the shoreside plant. Atmospheric temperatures over a period of a few days may vary as much as 100 deg., and variations of temperature of the sea water passing through the refrigerant condenser may vary 20 deg. or more in a day. A vessel passing from the Northern Hemisphere in deep winter will pass through the whole gamut of seasons during the possible ten days to the Southern Hemisphere. A well-equipped plant will have recording thermometers in each compartment.

Upon arrival in the port of discharge, we reverse the problems of the terminals at the loading port. In addition, there often is the problem of inadequate terminal facilities and a now more mature cargo. Due to climatic conditions, particularly in the tropics, damage may be caused by "sweating" of discharged cargo. Also, insult may be added to injury because of delays that might be encountered due to a not-too-alert or a not-too-sympathetic group of dock workers.

Ship Construction, Equipment

The seagoing refrigeration plant is essentially the same as that ashore. But its development and operations are peculiarly different from that of its shoreside counterpart. A ship, for instance, has vertical-dimension limitations. A steamer is not only a floating warehouse, but it must remain stable under all conditions of loading, in all kinds of weather and sea. The center of gravity of the loaded or empty ship must retain a positive relationship to the center of buoyancy. Obviously, the weight—and, consequently, the height of the structure above the range of the shifting center of gravity—is decidedly limited to insure that stability. Further, the hull of a vessel is nothing more or less than a floating beam, the supports of which continuously change in number and shift in position with the advancing waves.

To meet these stresses we must have internal strength members of decks, beams, frames, bulkheads, pillars and girders. These elements limit the dimension between decks. For practical reasons, our structural limitations usually dictate that an insulated room net height shall generally range from 6 ft. 6 in. to perhaps a maximum of 9 ft. Exceptions are found in the lower holds of the few all-refrigerated ships, but in these, slatted false decks are often built to prevent load-crushing of certain classes of cargo.

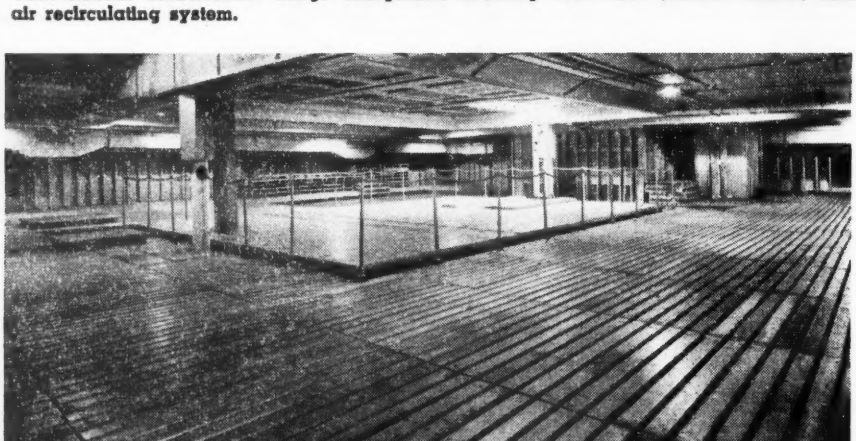
This limited head room precludes the general use of either bunkered or bare ceiling coils. Wall-mounted coils with gravity air circulation are assumed to be effective for a lateral distance of no greater dimension than one and one-half times the room height in the tightly stowed cargo space. But with the now generally installed recirculating air system (developed by the writer many years ago), it is safe to assume a horizontal effectiveness zone from wall coils of over two times the ceiling height. It is apparent that there is in consequence a definite limitation to room dimension.

One may ask why is there not a general use of the well-known cross-room cold air blast with coil bunkers to overcome this limitation? This is a controversial subject. The author believes that there is a tendency for the forced air to follow the path of least resistance and pass over, rather than through, the cargo, particularly in partially filled rooms. Further, the more frequent defrosting of refrigerating surfaces that is necessary has a nuisance rating with operating crews and is something that cannot be neglected. Cold air blast has not met with general acceptance aboard ship, except in specialized services, and seemingly is not well adapted to extreme low-temperature operation in marine service.

The types of construction used in insulating the compartments reflect these limitations, and much progress has been made in recent years. In the past, granulated or regranulated cork was frequently used and was well adapted to filling in large volumes between beams, frames, girders and deck-to-hull brackets. Wood framing, furring

(*Turn to page* 194)

Conventional construction. Cargo refrigerator showing wall coils (behind baffles) and air recirculating system.



Refrigerated hold of "S.S. Blue Jacket," a 13,893-ton C-2 Type freighter built for the U. S. Maritime Commission by Moore Dry Dock Co.

EDITORIALS

LAURENCE V. BURTON, Editor

Place of Research In a Democracy

A BIG decision facing the world today is the question of how far we can go toward democracy in politics and how far we can, at the same time, go toward a centrally managed economy in our business life. The two are incompatible, or mutually contradictory.

Either we can be a democracy with plenty of freedom and competition, or we can be a totalitarian state with no freedom and no competition. We can't have both simultaneously.

The impetus for the adoption of a managed economy usually come from business. If the future brings competition so vigorous that it tempts one to long for an absence of competition, let us shun a managed economy like pestilence.

The only safe answer to competition is research and development—not politics.

Products can be improved or selling prices can be lowered by cost reduction through research. Thus, the market can be broadened.

The time to start research is now, while there is still a sellers' market. In time of peace, prepare for war. Research is a prerequisite to continuation of democracy.

It's About Time

COMING about three years too late, the Army has a new setup that now makes it possible to utilize the specialized services of a technical man who has been inducted into the services. In the past there have been innumerable instances of fully or partially trained food technologists in various branches of the armed services doing their bit as soldiers when they were urgently needed in their professional capacity in, say, the Office of the Quartermaster General.

Unfortunately under the prior system, once an enlisted man was in an organization he could not be assigned to other work, no matter how urgent the need for his abilities. But under the new setup, after completing his basic training the professional specialist is assigned to the Gentral Staff Corps where he is available for reassignment to professional duties. As we understand it, the foregoing system does not, however, permit pulling an enlisted food technologist out of another type of unit, such as the infantry or a tank battalion.

It may well be that we have heard the last of such cases as the PhD biochemist doing Military Police duty, or in the case in Australia where a dozen food technologists, requisitioned from the United States, were not supplied on the ground that there were none available.

Synthetic Fatty Acids And Glycerine!

A REPORT to the Senate Committee on Oil Policy from technical investigators in Germany indicates that German chemists have developed processes for the synthesis of fatty acids from petroleum either natural or synthesized by the Fischer-Tropfsch process of hydrogenating coal. These acids run all the way from 2-carbon to 20-carbon molecules, and can be separated by fractionation.

The Germans also have developed processes for the conversion of cellulose to glycerine and glycol by direct chemical processes rather than the roundabout Scholler process of saccharification of wood and fermenting the sugar liquors by yeast. The latter gives glycerine as a byproduct.

Rumor, yet to be confirmed, has it that they have also succeeded in combining the fatty acids and glycerine to produce edible fats.

Any one of the foregoing ideas would be startling news. All taken together are triply startling. What does it bode for the future? We must wait until quantitative data are available, especially costs. If fatty acids or glycerine can be synthesized more cheaply than they can be produced from natural fats or vegetable oils, it may have a far reaching effect on our national economy. But speculation on the implication of such syntheses is idle until cost data are available.

New Microanalytical Technics

AT the June, 1945, meeting of the Nutrition Foundation, many interesting papers were presented, but the most stimulating was the informal report as yet unpublished, by Dr. Otto A. Bessey, of The Public Health Research Institute of the City of New York, on microdeterminations of various factors and nutriments in blood. The desirable feature about this technic is the very small quantity of blood (0.1 c.c.) needed, which is divided into several 30-cu. mm. aliquots for the many separate determinations.

The new microtechnic is not only sufficiently accurate for estimating various vitamins in blood, but it is very rapid.

Data are now rapidly accumulating, based on the condition of the blood, not on the food consumed. Already it is possible to observe marked and significant differences of, say, vitamin C in blood of children from three different economic groups.

These microanalytical methods should have many important applications in quality control laboratories. More important, however, are the rapid advances in nutritional science that should follow their adoption.

All should remember, too, that these researches into fundamentals (including analytical technics) have been financed by food manufacturers who support the Nutrition Foundation.

One Way to Happiness

DEBT is one of the old-fashioned horrors of most men who have traversed the rocky road of life. To those who have lived long enough and hard enough to esteem peace of mind above all else, it is a great satisfaction to be able to say, "I owe no man."

Admittedly the tendency of the past three decades has been more and more to ignore the homely virtues. In personal affairs, keeping up with the Joneses has become an indoor sport of increasing popularity, and in too many cases it is done on borrowed money. During the restraints of the war years it has not been so easy to live unwisely. The showy things that evidence opulence often are not to be had for love or money. Installment buying has been cut off. Wages are good. Prices are under reasonably good control. People really are saving money. In theory, almost every individual should be able to get out of debt.

This is not to be construed as opposing all borrowing by the individual person, but it is an argument for s a n i t y during these troublous times. Two sound rules about borrowing should n e v e r be forgotten: Never go into debt to buy something of diminishing value, like an automobile that inevitably wears out. Never borrow a sum larger than 1½ to 2 times your annual income, even for income-producing securities, for it will be well nigh impossible to pay off the debt if the security ceases to be remunerative.

The only time when debt is an advantage to an individual is in a period of inflation—rapidly rising prices—and that is unlikely to occur in this country. But even though it is an advantage to the borrower it is an equal disadvanatge to the lender. And it is not the American way to profit by the other fellow's hard luck. Nor does it promote national prosperity.

Prepare for the uncertain future while you may, never forgetting that debt is a chain to the past. There always will be plenty of troubles for everyone without augmenting them by unwise indebtedness. Frequently, debt makes it doubly difficult for one to adjust himself to changing circumstances of life.

Lessons from Belsen

OUT of the unbelievable horrors of the German political prison camps — Belsen, Buchenwald, Dachau and the like—it has been hoped that something worthwhile might be salvaged, something other than discoveries of refinements of torture compared to which the days of the Inquisition were trivial. Apparently it is a vain hope. If the Germans had a scientific or other purpose in mind, the results have been destroyed or successfully concealed. Yet it is a provocative fact that the victims in these camps were *half-fed.* If the victims were to be starved to death anyhow, why feed them at all? Why *half-feed?*

British and American scientists who have attempted to save as many as possible of the lives of liberated political prisoners, and who are familiar with the awful conditions, have sought in vain for a reason—or even a theory—to explain the half-feeding. After all, a tremendous amount of work is involved in preparing and cooking even a half-quantity of food for 20 to 30 thousand persons. No one has yet been able to explain why the Germans fed the prisoners with any food at all.

Psychological Results

In due time, the full scientific reports on the political prison camps may be expected. In the meantime, the following is a partial summary of observations by a world-famous scientist, as communicated directly by conversation.

The most startling effect of slow starvation is the psychological and moral deterioration that follows. Even well-known intellectuals are reduced to mere animals, long before their physical death. They have been compared to starving wolves, taking any risk or robbing any weaker person to get food. Even after they have been rescued and fed back to what appears to be normal their moral sense is completely gone. Well-fed, though once-starved, physicians who had been entrusted with the care of other still helpless, rescued prisoners soon had to be replaced because they actually stole their own patients' food! They stole it even though they themselves were on a 4,000-calorie diet. Their moral sense was completely gone. This is based on experience with about 100 medicoes and 200 nurses—not on a single instance.

Though many bodies may be returned to health, there is no fore-telling the recovery of their minds. Up to now, there is no information on which to base a forecast—unless, perchance, the Germans have it secreted somewhere.

One Positive Benefit

One of the few useful bits of knowledge gained from the slow starvation of human beings is to dispel the notion that stomach and intestinal enzymes disappear or dry up after several days with no food. Based on the old theory, the rescue crews brought huge quantities of hydrolysed casein for feeding the thousands of nearly dead. This product is satisfactory, but at one camp the supply ran out. Rather than let huge numbers of people die they were fed experimentally on nothing more than skim milk,* one cupful about every four hours. In a day and a half nearly all could eat a soft diet. From then on physical recovery was rapid.

The observation that skim milk* is entirely satisfactory to start feeding a starving person seems to be the only bit of beneficial knowledge gained from the sacrifice and torture of hundreds of thousands of lives.

But why the Germans half-fed their victims instead of promptly killing them or completely starving them is still to be explained.

*Note to American Dry Milk Institute: This is a British food term.

Instrument Air *must be* CLEAN AIR!

Remember! Only a Nash Compressor can supply Clean Air!

Because Nash Compressors have no internal lubrication and because delivered air is thoroughly washed within the pump, the Nash delivers only clean air, free from dust, heat, or oil. Therefore, instrument air supplied by a Nash assures immediate instrument response and eliminates all troubles resulting from fouled instrument lines, gummed orifices, and rotting instrument diaphragms. Also avoided are trouble and expense of the usual oil filters, dust filters, and after coolers, as none are used. Nash means dependable, low cost instrument operation.

Nash Compressors produce 75 lbs. pressure in a single stage, capacities to 6 million cubic feet a day in a single structure. No valves, gears, pistons, sliding vanes, or other enemies of long life complicate a Nash. Original capacity is maintained throughout a long life. Investigate the Nash Compressor now.

No internal lubrication to contaminate air handled.

No internal wearing parts.

No valves, pistons, or vanes.

75 lbs. pressure or 26 in. mercury vacuum in one stage.

Non-pulsating pressure.

Original performance constant over a long pump life.

Low maintenance cost.

NASH ENGINEERING COMPANY
334 WILSON, SO. NORWALK, CONN.

NEW PACKAGES & PRODUCTS

Home Sweetener

WHEN A. E. Staley Mfg. Co., Decatur, Ill., decided to push its enzyme-converted corn sirup, Sweetose, for the domestic market, it selected 1-pt. (1½-lb.) clear glass bottles with red enameled screw caps as containers. Labels feature white and a clear color contrast.

Three corn sirup blends are offered. The Crystal Syrup is flavored with vanilla and salt. The Golden Syrup is blended with refiners sirup and labeled in deep blue. Both of these are suitable as a carbohydrate supplement to milk for infant feeding.

The Waffle Syrup contains imitation maple flavor, sugar cane products, caramel coloring and salt. Its label is black and white.

Has All Its Vitamins

PRECOOKED cracked wheat containing the natural wheat germ vitamins is offered by George Haig Co., New Haven, Conn.

Haig's Wheet is suggested as a "stretcher" for meat or for use in place of rice, potatoes or macaroni.

The 1-lb. package is in a folding cardboard carton printed in red and black on white, with green accent in the central picture.

For Overseas

INERT GAS packing for fruitcake and nutmeats will insure safe transit overseas. In the cake packed exclusively for it, Bloomingdale Bros., Inc., New York, includes soya flour, cottonseed flour and malt, as well as invert sugar, shortening, eggs, flour, sirup, candied and diced fruits, raisins, nuts, flavoring, leavening and salt.

One pound is baked in a No. 2 tin. The label is in brown with white and two shades of green.

Pecans, as a companion pack, may be had either salted or unsalted, as desired, 8-oz. in the same size tin. The label is in a matching brown and white, with pecans for a background pattern.

Four-color Label

AIRLINE unsweetened Prune Juice, in a 1-qt. bottle, has a new label featuring a full-color picture of the dried fruit and a glass of juice to provide color interest. The brand name appears in white on a red band.

Max Ams, Inc., New York, is the manufacturer.

Dry Milk by the Quart

DIRECTIONS for reconstituting form an important feature of the design for the Kraft Powdered Whole Milk package. The product is now available in test markets in Oklahoma, Arkansas, Kansas, New Mexico, Alabama, Florida and the western half of Missouri—in districts where fresh milk is relatively hard to get.

Kraft Cheese Co., Chicago, spray dries the milk by a patented process which insures that its keeping time is at least 60 days. It is packed in

laminated pouch-type glassine envelopes with heat-sealing closures. Two envelopes, each holding 4 oz., are enclosed in a folding cardboard carton. According to the directions, each envelope will dissolve in water to make a quart of whole milk.

It is claimed that the product is "like" soft curd milk. Vitamin D is added so that each quart of fluid milk will supply 400 U.S.P. units.

The cream-colored carton is printed in dark blue and red.

Canned Carp

LAKE FISH (Tuna Style) marks the entry of fresh-water carp into the realm of canned fish. Canning is now being carried out in a pilot plant, with the product going to the Quartermaster Corps. Commercial distribution is contemplated soon.

The canning process includes the steps of brining the cleaned fish, then pressure cooking for 45 minutes, flaking and boning. Flakes

are packed in cans with cottonseed oil and retorted for 95 minutes. A 3.07x3.06 can with a special lacquer holds 14 oz. For the Army, identification is printed on the can top.

Lakefish Canning Co., Inc., Mankato, Minn., developed the canning technic with the help of research by the Smaller War Plants Corp. This is believed to be the first successful process for canning fresh-water fish, as well as a most promising beginning for turning the carp, which has always rated as a nuisance, into an asset.

Tasty and Cool

ANOTHER new jellied consomme powder is that offered by Dry-Pack Corp., New York. This contains gelatine, hydrolized vegetable protein derivative, dehydrated onion and parsley, salt, sugar and spices, with U. S. certified color added.

The consumer package, a folding box 4 in. square and slightly under ¾ in. in thickness, holds a total of

2½ oz. of the powder, in 10 heat-sealed glassine envelopes. Each envelope will make 1 cup of soup.

The box has on its principal face the legend, Jellied Consomme Dry-Pack, and a four-color picture of a serving of the jelly in a blue bowl. White and cream form the background, with red and orange for emphasis.

An institutional pack uses ½-lb. bags, each producing 2 gal. of consomme.

A convenience feature of this product is the short time required to produce the jelly.

Coffee Tablets

SPRAY-DRIED coffee infusion compressed into tablets for easy use is being marketed by John L. Kellogg & Co., South Elgin, Ill. Each tablet of Frozen Flavor Instant All-Coffee makes one cup of hot coffee.

Thirty tablets, having a total weight of 2 oz., are packed in a straight-sided glass bottle about 1 in. in diameter, with a metal screw cap having a coated paper sealing disk.

The label is in brown and ivory. A brown and ivory folding carton not only protects the bottle from breakage but also decreases the exposure of the coffee tablets to light.

No More $TONE$ in Your Bottle-Neck!

• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour.

Write for Bulletin FI-845

SUTTON, STEELE & STEELE, INC
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign—Separations Engineering, Ltd., 133 Bush House, Aldwych, London

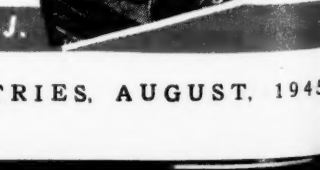
To retard *browning* and *loss of flavor* upon thawing—two of the major problems which must be conquered if frozen peaches and apricots are to satisfy housewives, bakers and the ice cream industry—many more processors are using ascorbic acid (vitamin C) for the first time in prefreezing treatment of their 1945 pack.

Hoffmann-La Roche first supplied ascorbic acid for this purpose several years ago. But war brought unprecedented demand for vitamin C for military and Lend-Lease purposes. Only when WPB restrictions were lifted in December, 1944, did ascorbic acid become available for wide scale use as an antioxidant.

From the days of earliest research on vitamin C the name Hoffmann-La Roche has been associated with ascorbic acid. Today the pharmaceutical chemical industry looks to Hoffmann-La Roche for its production "by the tons." We have felt privileged to supply a major portion of the frozen fruit industry's 1945 ascorbic acid requirements and to have our technical experts in your plants.

* * *

Commercial processors desiring technical information and costs are invited to write to our Vitamin Division.



Vitamin Division, HOFFMANN-LA ROCHE, Inc., Nutley 10, N. J.

FOOD INDUSTRY NEWS

GENERAL

Food Outlook Strengthened By Early Action of New Secretary

Anderson sets up machinery for carrying out new slaughtering provisions as he merges WFA with department.

DURING the first weeks of his administration of the Department of Agriculture, Secretary Clinton P. Anderson has made a highly favorable impression upon both the food industry and the country as a whole. The new secretary lost no time putting into action the provisions of the Patman amendment to the Stabilization Act, under which non-Federally inspected slaughterers may be certified and thus released from killing quotas or other slaughter limitations, including the prohibition against shipping interstate.

In his first pronouncement as secretary, Mr. Anderson outlined a 4-point program "in order to provide a firm foundation on which to build."

The first point in the program was to consolidated the department and the War Food Administration into one working organization. This was accomplished by dissolving WFA, as such, transferring its authority and personnel to the department. The second point was to coordinate food production and pricing policies, designing them so that maximum production of food may be attained while still holding the line against inflation. This calls for close cooperation with OPA, which Mr. Anderson is expected to attain through frequent consultation with the OPA administrator and strong White House backing.

Point No. 3 calls for the securing of fair and equitable distribution of food supplies in meeting military, civilian and foreign relief requirements. This has already been reflected in the cut back in many military orders, in the attempt to spread these orders over a longer period, where possible, in the sharp warning to the foreign nations that "America cannot feed the world," and in blasting the attitude that U. S. civilians are to be regarded as simply residual benefactors, to divide what is left after all other claims have been fulfilled.

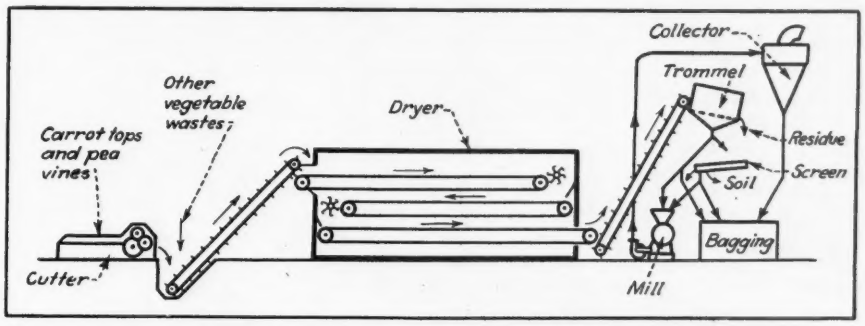
The final point, to restore food to legitimate channels of trade through rigid black market controls and tough enforcement, will take some time to show any results even if carried out effectively.

In speaking of the efforts to increase food production, Secretary Anderson asserted that such a program requires attaining "immediate confidence among farmers that promises of price support for needed crops will be carried out in full. He cited the protection afforded other war industries against loss when contracts were cancelled and declared that farmers must be given the same kind of protection. "There should be no repetition," he said, "of the time when support prices on hogs broke under the pressure of heavy production coupled with over-optimism for an early end of the war. Price support programs must be carried out in full. They must be regarded as a firm commitment by the government."

With the elimination of WFA, Secretary Anderson got some of the power, though the law that would have made him the "food czar" was not passed.

He must find out what food is on hand and what food must be supplied to meet the requirements for the military, the civilian population, Lend-Lease, UNRRA, and the open-market purchases of our allies. He must establish crop goals which will provide the food to meet these demands and see to it that the farm machinery and the labor is available to carry the plans through. He must set up a program to distribute the available supplies and divide them between the major claimant agencies and see to it that nothing interferes with that program.

One of the weaknesses of Judge Jones' administration of food matters was that he did not move decisively enough to prevent food programs from being dislocated by the actions of other agencies. Last year when cold storage warehouses needed labor to repile meat in their freezer space in order to handle more of the huge quantities being produced, Judge Jones is on record as having asked War Manpower Commission for assistance in securing that labor. He is not on record as having squawked loudly when the needed labor was not forthcoming.



NUTRITIOUS LEAF MEALS FROM VEGETABLE WASTES

Vegetable wastes can be converted to valuable sources of protein, carotene and riboflavin by dehydration. Tests have demonstrated the value of these dried wastes as poultry feed supplement and as raw material for carotene. Above is a flowsheet of the process. The waste is chopped (if required), dried in a multiple-belt dehydrator, passed through a rotating screen or trommel, a vibrating screen and a hammer mill equipped with a cyclone separator and a two-way sacker. Dehydration is fractional, the leaves coming through brittle, the stems wet, and the two being separated in the rotating screen. In processing pea vines, the product bypasses that screen and goes directly to the hammer mill. Production rate for a 930-sq. ft. dryer is 5,580 to 7,450 lb. an hour. Cost of equipment and building is $48,000; cost of drying, from 0.81 cents a pound for lima waste to 3.82 cents for beet tops. These wastes have been dried: broccoli, beet tops, spinach, kale, carrot tops, lima and pea vines. Complete details are available in a report issued by David A. Colker and Roderick K. Eskew, Eastern Regional Research Laboratory.

Officers Elected by Fisheries Institute

J. LAWRENCE ALPHEN, president of General Seafoods Corp., a subsidiary of General Foods, recently was elected president of the newly formed National Fisheries Institute, Inc., at an organization meeting in Washington.

Other corporate officers elected were, vice-president, O. L. Carr, Mid-Central Fish Co., Kansas City, Mo.; secretary, F. M. Bundy, Gorton-Pew Fisheries, Ltd., Gloucester; treasurer, Harry L. Claxton, R. W. Claxton Co., Washington.

Offices of the organization will be maintained in Washington, with Charles E. Jackson, resigning as assistant deputy coordinator, Fish and Wildlife Service, Department of Interior, to become general manager, and Raymond E. Steele as executive secretary.

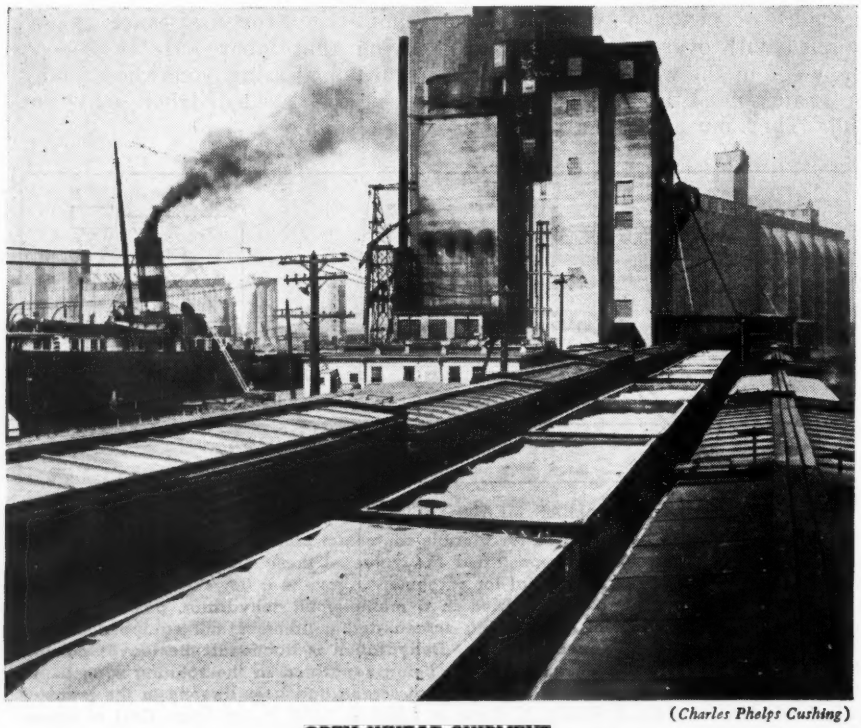
The main objective of the Institute is to bring the commercial fishing industries of the United States together as one complete body, acting in full cooperation and unison in the interests of the general public.

The program will include the promotion of the inclusion of fish in school lunch programs, representation in Washington, cooperation with the Fish and Wildlife Service and other government agencies, an educational program to improve consumer acceptance of fish products, educational program for fish handlers aimed at utilization of best methods of handling, transporting, displaying, and selling, and cooperation of firms engaged in fish production toward mutual aims.

Labor Wants to Hold Peak Take-home Pay

LABOR organizations are resisting the cut back in take-home wages as overtime is canceled. Uncle Sam may have set the pattern for handling these cases in the action which was taken by Congress for government employees. It is certain that labor leaders are going to attempt a similar plan for industry workers.

Pay of all civil service employees of the government was raised by Congressional action, effective July 1, so that in the contemplated 40-hour week they will be paid at a rate equal to or greater than that which applied to the 48-hour wartime week for these same workers. In fact, those paid base salaries in the lower ranges will get more for 40 hours, when that schedule is adopted, than they have been getting during the 48-hour period. And overtime for those working either 44 or 48 hours in the immediate future represents a still further increase in take-home payments of all the federal employees.



(Charles Phelps Cushing)

OPEN WHEAT SHIPMENT

This unusual sight springs from an experiment carried out in Buffalo, when boxcars were not available to carry the wheat from shipside elevators to milling plants in the area. No losses on the experiment have been reported.

Washington notes also two other influences. The government reports that farm wages are still at the highest level of all time and the implication is that they will continue high even after the war. As yet no specific program has been adopted by the administration to raise a minimum hourly wage for industry under the Wage-Hour Law; but it is confidently expected that the President and Congress will up the present 40-cent minimum before any large amount of unemployment is experienced. Whether the new minimums will be 50 cents or more is anybody's guess. But there seems no doubt in any Washington group that factory wages will be increased per hour significantly during the next 12 months.

Federal Workers Told Not to Circumvent Law

A NOVEL order regarding administration of labor laws was announced by the new Secretary of Labor, Lewis B. Schwellenbach, as his first departmental order following his taking of office on July 2. The department publicized the following statement:

"I must insist that in this department there is given full recognition to the fact that it is the function of this department to execute the laws. The duty of an officer in this department is to accept the laws as Congress has written them and as the courts have interpreted them.

"The fact that he may think the Congress should have written, or the courts should have interpreted a law differently in no case justifies him in ignoring or attempting to circumvent the law. I will expect full cooperation in this policy."

Even more significant as indicating a general government policy was the announcement that this instruction to the department staff had been submitted to the President and approved by Mr. Truman before issue. In fact, Washington promptly jumped to the conclusion that the President would issue a comparable instruction for other departments.

Experienced Washington observers note that there is nothing in this order, even if observed with great care, to prevent pressure groups, especially labor organizations, from continuing to bring pressure. And when the pressure is strong enough, they forecast, there will be a yielding in Congress if the departments do not find a way to give favorable rulings within the scope of the law on the

LIFT TO PRODUCTION

Labels for a varied line sold under one brand name must be properly designed and properly placed on the right glass container to lift the line to maximum visibility and sales appeal. Owens-Illinois' wide experience with the variables of glass "architecture" and label design . . . has helped many firms get more production and more "sell" from Duraglas bottles and jars.

A LIFT TO DISTRIBUTION

Since the Duraglas package was hooked up with the famous fifty-year-old name of KC, the combination has been proving itself as "full of rise" as KC itself.

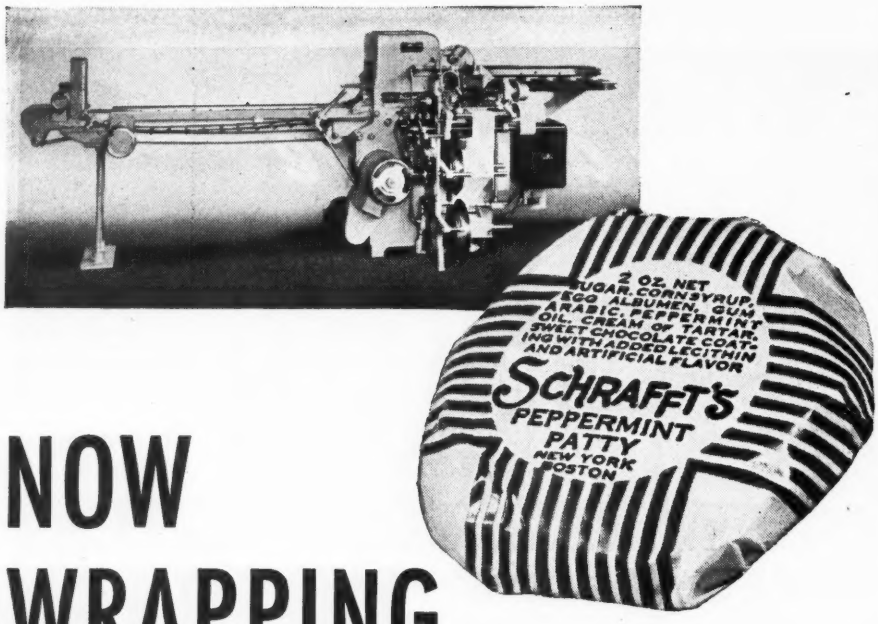
According to retailer reports promoting the story of how KC's DURAGLAS jar keeps baking powder fresh and strong and dry to the last spoonful, produced a marked "up" in KC movement. It proved baking powder, long regarded by retailers as a staple, was RESPONSIVE TO SPECIAL DISPLAYS.

A LIFT TO SELLING

Duraglas consumer advertising hastens the trend to glass that already plainly exists. For example, decision to put KC Baking Powder into glass was prompted by a survey which showed that, even before promotion, 11,000,000 housewives—a substantial percentage of the nation's total—preferred baking powder packed in glass . . . a preference expressed in sales increases when KC in Duraglas Containers appeared on the market.

OWENS-ILLINOIS GLASS COMPANY
TOLEDO 1, OHIO
Branches in all Principal Cities

Duraglas
TRADE MARK REG. U. S. PAT. OFF.
CONTAINERS!
Preserve, Protect and Sell by Sight



NOW WRAPPING

PEPPERMINT PATTIES

as well as irregular candy bars

Here's good news for manufacturers who have had to contend with high-cost hand-wrapping of disc-shaped products such as peppermint patties. Our model DF can now be made to wrap these items at a speed of 90 per minute. You will note from the illustration above that the wrapper, which is firmly sealed at the bottom, conforms perfectly to the shape of the patty. The printed design is accurately located by electric eye.

Our DF machine is also widely used for wrapping irregular bars and produces a smooth, box-like wrap no matter how uneven the outline of the bar may be. It handles practically any wrapping material, including cellophane, glassine, plain or laminated foil, etc., and will apply an inner liner, if desired. It is quickly adjustable for various sizes.

Consult our nearest office for complete information and literature on the DF or for suggestions on any packaging problem.

ARMY E NAVY

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts
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PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

statute books. As one observer said, "We have a little less one-sided labor government than we had a few months ago."

"A" and "Star" Awards Earned by Food Plants

DISTINGUISHED for outstanding service in the processing of food, 35 more food processing plants have earned the United States Department of Agriculture achievement "A" award and nine plants have earned the "Star" award which is given for a second year of outstanding performance. These nine plants previously have been given the "A" award. After a plant has earned the "A" award, a "Star" is given for each additional year of outstanding performance.

"Star" awards have been granted to the following:

Two plants of the B. F. Shriver Co. located at New Windsor and Westminister, Md.; B. F. Shriver Co., Littlestown, Pa.; Reid-Murdock & Co., Ellsworth, Mich.; Sharp Canning Co., Rockford, Ohio; Barron-Gray Packing Co., San Jose, Pratt-Low Preserving Co., Santa Clara, Walti, Schilling & Co., Inc., Santa Cruz, Calif.; Rocky Mountain Packing Corp., Ephriam, Utah.

"A" awards have also been granted as follows:

S. D. Chamberlin & Sons, Inc., Hartford, Conn.; Lafayette Packing Co., Rockland, William Underwood Co., Bass Harbor Plant, McKinley, and Jonesport Maine Plant, West Jonesport, Me.; A. D. Makepeace Co., Wareham, Mass.; Birds Eye—Snider Division of General Foods Corp., plants at Albion, Avon, Fulton, Geneseo, Medina, Mt. Morris, Rome, and Wayland, Dorset Foods, Ltd., Long Island City, N. Y.; Central Produce Co., Chicago; New Era Canning Co., New Era, Mich.; Land O'Lakes Creameries, plants at Milaoa and Rush City, Minn.; Henderson Produce Co., Laclede, Producers Produce Co., Shelbina, Mo.; North Dakota Mill & Elevator Co., Grand Forks, N. D.; Lange Canning Corp., Eau Claire, Wis.; Cornelius Packing Co., Los Angeles, Naman-Krum Co., Fresno, Vacu-Dry Co., Oakland, Van Camp Sea Foods Co., Inc., plants at San Diego and Wilmington, Calif.; The Appella Co., Selah, Wash.; Jerpe Dairy Products Corp., Fayetteville, Springdale Canning Co., Springdale, Steel Canning Co., Lowell, Ark.; Swift & Co., plants at Dallas and Fort Worth, Tex.; Castleberry's Food Co., Augusta, Ga.; The Borden Co., Macon, Miss.

Predict Chickens Bred To Housewives' Order

POULTRY specialist Dr. Morley A. Jull, at the University of Maryland, predicted that development of a fine meat-type chicken—broad breasted to allow abundance of carvings and with drumsticks heavy with meat, would be achieved in a few years.

Making a statement of a nation-wide contest to be promoted by the International Baby Chick Association to quicken breeding of a broad breasted chicken, Dr. Jull said: "The turkey breeders have pointed the way. They have been successful in breeding just the type of meaty bird the average housewife wants."

CATSUP PACKERS...BOOST FLAVOR...SAVE TIME WITH BASIC DRIED ONION AND GARLIC

6 BIG ADVANTAGES TO PACKERS

1. Save Labor. Fully prepared Basic Products are ready-to-use.
2. You lower Onion and Garlic costs and have no price fluctuations thru the year.
3. Your food has a *uniform* taste thru the year. Fresh onions vary 300% in flavor. Basic Onion and Garlic flavor is *constant*.
4. You do away with onion peeling and preparing.
5. Saves your factory from disposal of 400 pounds of waste in every ton of onions.
6. Saves loss from fresh onion spoilage. You store several months supply in a small storage space without refrigeration expense.

WRITE FOR BOOKLET

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BASIC
ONION AND GARLIC HEADQUARTERS

"Basic knows its Onions
.... and GARLIC!"

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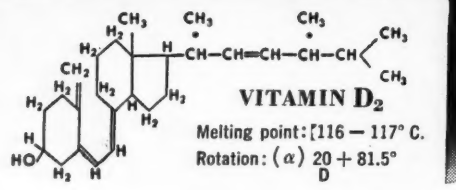
CHEMICAL COMPANY, INC.

Now Offers . . .

PURE SYNTHETIC

Vitamin D_2

★(CALCIFEROL)



Winthrop's synthetic vitamin D_2 (Calciferol) is free from lumisterol, toxisterol, suprasterol, and other by-products of irradiation. It never varies in antirachitic potency.

OTHER WINTHROP PURE SYNTHETIC VITAMINS:

- **TRIDEE**—Winthrop's Brand of vitamin D_3 in Corn Oil
- **VITAMIN B_1** (Thiamine Hydrochloride)
- **VITAMIN B_2** (Riboflavin)
- **NIACINAMIDE**
- **VITAMIN B_6** (Pyridoxine Hydrochloride)
- **CALCIUM PANTOTHENATE**
- **VITAMIN C** (Ascorbic Acid)
- **d-ISO-ASCORBIC ACID . . .**
- **AMINO-ACIDS:**
  Tryptophane
  Phenylalanine
  Methionine
- **"B-E-T-S"**—Winthrop's Brand of Bread-Enrichment Tablets
- **"VEXTRAM"**—Winthrop's Brand of Flour-Enrichment Mixture

POTENCIES AND PACKINGS:

Crystalline Form in ampules of one, five, and ten grams (40,000,000 U.S.P. units per gram)

Solution in Corn Oil: 1,000,000 U.S.P. Units per gram* packed as follows:

400 Standard Units in one pint
1,000 Standard Units in imperial quart
2,500 Standard Units in 9¼ oz. amber bottle
50,000 Standard Units in 15½ gallon drums S/S

Also Solution in Corn Oil: 200,000 U.S.P. Units per gram packed as follows:

250 Standard Units in 5¼ oz. amber bottle
500 Standard Units in 9¼ oz. amber bottle
3,000 Standard Units in 5 gallon carboy
10,000 Standard Units in 15½ gallon drums S/S

*Standard Unit=1,000,000 U.S.P. Units

WINTHROP

For prices and information address
Special Markets Division
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170 Varick Street, New York 13, N. Y.

★ Sole Manufacturer under U.S. Patent 1,902,785 granted to Winthrop Chemical Company, Inc.

(*Wide World*)

BUT IT'S MEAT

These live giant sea turtles are part of a shipment of approximately 100, which arrive at Tampa, Fla., about once every two weeks. They are turned into turtle soup and steaks for hotels and restaurants the country over.

Dr. Jull pointed out that at College Park experiments have been made for some time to develop a chicken similar to the popular broad breasted turkey.

"Our aim is to improve the body type and fleshing ability of the chicken," he said. "There is a great demand for such a chicken, principally because of the widely different body types of different strains, so that the housewives deplore the lack of uniformity in chickens available as fryers and roasters."

Dr. Jull and associates are working on developing a strain of chicken that "will utilize feed most efficiently."

Hearings on BBH Bill To Set Workers' Status

IN the opinion of the sponsors of the Hatch-Burton-Ball Federal Industrial Relations Act, workers in food processing plants are within the scope of the proposed measure. However, the question of whether cannery workers are in or out has been raised. The issue will be thoroughly covered at the hearings at which a clarification of the language of the bill will be attempted.

In the form the legislation was introduced, "employment of agricultural labor by farmers and cooperative associations of farmers" is excluded from the scope of the

Ah- the humidity of it all

—why didn't they ship in the

CHURCH CONTAINER

FRESH FOODS EVERYWHERE

Perishable Foods Require Non-Perishable Temperature

How an Advanced Technique Widens this Market

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Executives have been impressed with the tests made in shipping perishable items for long distances under extreme weather conditions in Church Containers. Across the continent even temperatures are maintained.

For the first time scientific control of temperature in a scientifically designed container comes to the aid of sales executives of perishable food products.

These containers proved to be a natural for the transportation of human blood from donation centers to laboratories where it is processed into plasma for the Army and Navy. As quickly as Church Containers are released from this and other war services they become available to those companies on the waiting list who plan to add fast express transportation for perishable items.

Food shipped in Church Containers being held within a three degree rise in temperature per day, arrive at stores in a condition which will help build the business. The stores exhibit the 10 cubic foot container to prove the freshness of the products sold. The full details of Church Container service are already near your office. Your local Railway Express Service representative has them for you. Call him.

CHURCH FREIGHT SERVICE INC., 17 East 42nd St., New York, 17, N. Y.

A CONVEYOR-COORDINATED PLANT that you can be proud of!

ARE you satisfied with your present production plant? Does material or goods in process flow smoothly with the least disorder, loss of time, waste of space or man-power?

If there is room for improvement, isn't it a matter of better coordination—better linking of all the steps involved from receiving — to shipping?

Whether your rate of manufacture is several hundreds a minute or one an hour, Standard builds conveying equipment to meet the situation.

The range and versatility of Standard Conveyor equipment are the result of nearly 40 years of close contact with inside-the-plant transportation — in plants large and small, making products as widely diverse as steel or cosmetics. The benefit of this experience is available to you, without obligations. The counsel of Standard Conveyor engineers is valuable in deciding on the right kind of conveying equipment to coordinate operations faster — for lower cost.

Write for comprehensive reference book —"Conveyors by Standard"— Catalog No. FI-85

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General Offices: North St. Paul 9, Minn.

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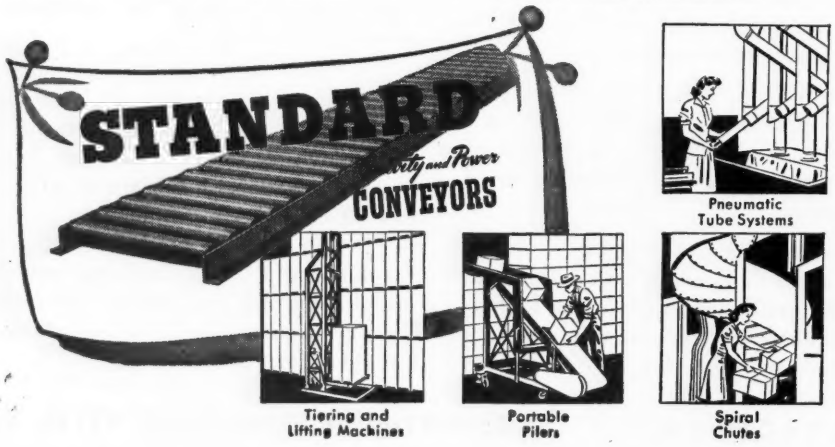


act. The definition of agricultural worker might be expanded by judicial interpretation to include labor at food processing plants.

Heavy Rains Improve Crops in Australia

AUSTRALIA'S 1945-46 wheat crop, estimated at 100,000,000 bu., will be double that of 1944-45, according to their Commerce Department reports.

Heavy rains are still falling on the drought-parched areas. A departmental spokesman said home consumption of wheat had risen to 100,000,000 bu. largely due to the increased use of wheat for stock feed. Good rains would restore pastures and ease this drain. Australia had almost exhausted her carry-over of 153,000,000 bu. from the 1943 season. A harvest next year of 100,000,000 bu. would end local shortages but would leave little for export, he added.

PROCESSING

Butter Content Tops 15,000 Vitamin A Units

THE weighted average vitamin A potency for all butter is between 15,000 and 16,000 international units per pound, according to studies recently revealed by the National Research Council with the cooperation of 19 states, the Bureau of Dairying, and the Office of Experiment Stations.

Summer butter, which includes 64 percent of all the butter made in the U. S., averages nearly 18,000 vitamin A units per pound, while winter butter averages over 11,000 units. Of even more importance, according to the report, is the survey's pointing of the way toward the possibility of improving the quality of milk in terms of vitamin A units. Vitamin A content of milk is dependent upon the quantity of carotene in the diet of the cow. Milk of 4 percent fat content produced under average winter feeding conditions usually contains about 1,140 vitamin units per quart. On the other hand, much milk produced under summer conditions has a vitamin A potency of as high as 2,500 to 3,000 units per quart.

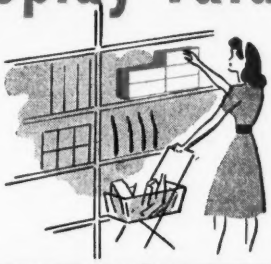
An individual eating 18 lb. of average butter a year gets about 740 units of vitamin A daily from that source. It is estimated by the Bureau of Dairying that, in 1941, the average person received about 2,340 vitamin A units per day from all

GIVE YOUR PACKAGE THE I.Q. TEST

Requirements for Impulse Quota

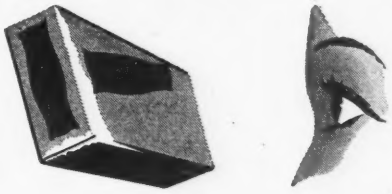
color

display value

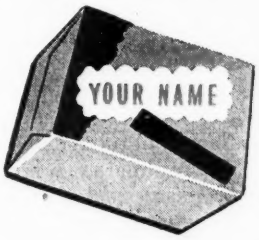


selling copy

eye appeal



brand identity



Your package must have these vital ingredients to be self-selling in a market where products will have to sell themselves! Each factor is a powerful entity... carefully built into the final design by expert artists and designers. Make sure the consumer will "Obey that impulse" by giving your package this I.Q. test... make doubly sure by educating your package at MILPRINT!

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YARWAY STRAINERS

dairy products consumed. The total requirement for a human is estimated at 5,000 vitamin A units daily. Of great importance is the fact that by carefully preserving winter dairy cattle feeds to maintain the carotene content, the vitamin A supplied by milk and its products could be materially increased.

Changes Foreseen in Coming Food Standards

NEW food standards will ultimately develop for several new types of cheese and for such corn products as meal, flour, grits, etc., as a result of the recommendations to Food and Drug Administration by its Food Standards Committee. However, it may be some months before the first formal hearings on these subjects are held. Complete formulation of the proposed new standards of identity will require considerable time for the present curtailed staff of F&DA.

The committee recommended among other things that pasteurized milk be used in the manufacture of all varieties of cheese whenever possible. It is likely that this will be at least a recommendation if not a requirement for existing standards, and that it will be a part of the proposed new standards for additional types of cheese, such as brick, swiss, munster, limburger, etc.

In formulating standards of identity for corn products, it is likely that the proposal will follow the committee's recommendation that enriched corn meal, and other enriched products, follow as nearly as practicable the enrichment level of the standard for enriched wheat flour.

At mid-July the only active case for which standards hearings had been set was that related to oysters.

Production Started in German Food Plants

THE Quartermaster Corps reveals that all food processing factories in the 15th Army area in Germany that are now capable of production are at work. War damage, lack of raw materials, and lack of power are keeping some closed, but none are shut for lack of permission to operate.

For a time there was a question as to whether facilities would be available to handle the Rhine valley grain and cherry crops. It has now been determined that the number of mills in operation is sufficient to

324 DIFFERENT PRODUCTS NOW PROVE THE ECONOMY OF MULTIWALL PAPER BAGS

324 different products – foods, chemicals, fertilizers, cement and other building materials – are now being packaged and shipped in St. Regis Multiwall Paper Bags.

These sturdy containers are daily proving their efficiency and economy under the rigorous conditions of wartime shipping. Husky, moisture-resistant Multiwalls protect products from dampness, salt spray, and even rain. And, Multiwalls reduce siftage losses as well as losses caused by infestation and contamination.

In addition, Multiwall Paper Bags are easy to handle . . . save manpower and valuable loading and unloading time.

Faster packaging, too – Specially designed St. Regis bag-filling machines bring high speed and a saving of labor and equipment to the users of Multiwall Bags.

By the Valve-pack System, for example, your product is accurately pre-weighed and automatically propelled into self-closing bags.

A complete bag-packaging service – St. Regis manufactures all types of Multiwall paper bags and bag-filling machines. Our packaging engineers are now available to study your packaging problems and to recommend the complete units which will be best suited to your individual needs.

If you are considering a better all-around package for your post-war production, call your nearest St. Regis representative TODAY.

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No matter what your cleaning problem may be — the answer is Wyandotte

YES, the Wyandotte line of cleaners is complete with products for any kind of cleaning job—whether it's on food equipment or in the department of building maintenance. Regardless of your plant or water conditions, you can depend on these specialized Wyandotte products for *thorough* cleaning.

Then—for a final germicidal treatment—use Wyandotte Steri-Chlor* as a rinse or spray. It's the last word in sanitation. Germs don't stand a chance against it.

For helpful advice on any cleaning problem, call the Wyandotte Representative. He's always at your service.

**Registered trade-mark*

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION • J. B. FORD DIVISION
WYANDOTTE, MICHIGAN *Service Representatives in 88 Cities*

handle this year's grain. There are also canning facilities for the cherries, although the quantity will be below normal because of the lack of sugar.

Quartermaster officers point out that they have been handicapped chiefly by the lack of definite knowledge as to what are the minimum essential requirements of the German population. Determination of this question will be the function of the food and agriculture office, which has just been set up at Bonn, as part of the Rhine province government.

Among the food items now being produced in the German plants are flour, coffee, marmalade, soup products and sauerkraut.

New Machinery Quotas Issued for Processing

ADDITIONAL authorizations for the manufacture of food processing machinery, in the third and fourth quarter, were granted by WPB during July. This action is in line with the government's stepped-up food program and follows in the raising of the industry's preference rating from AA-3 to AA-2X.

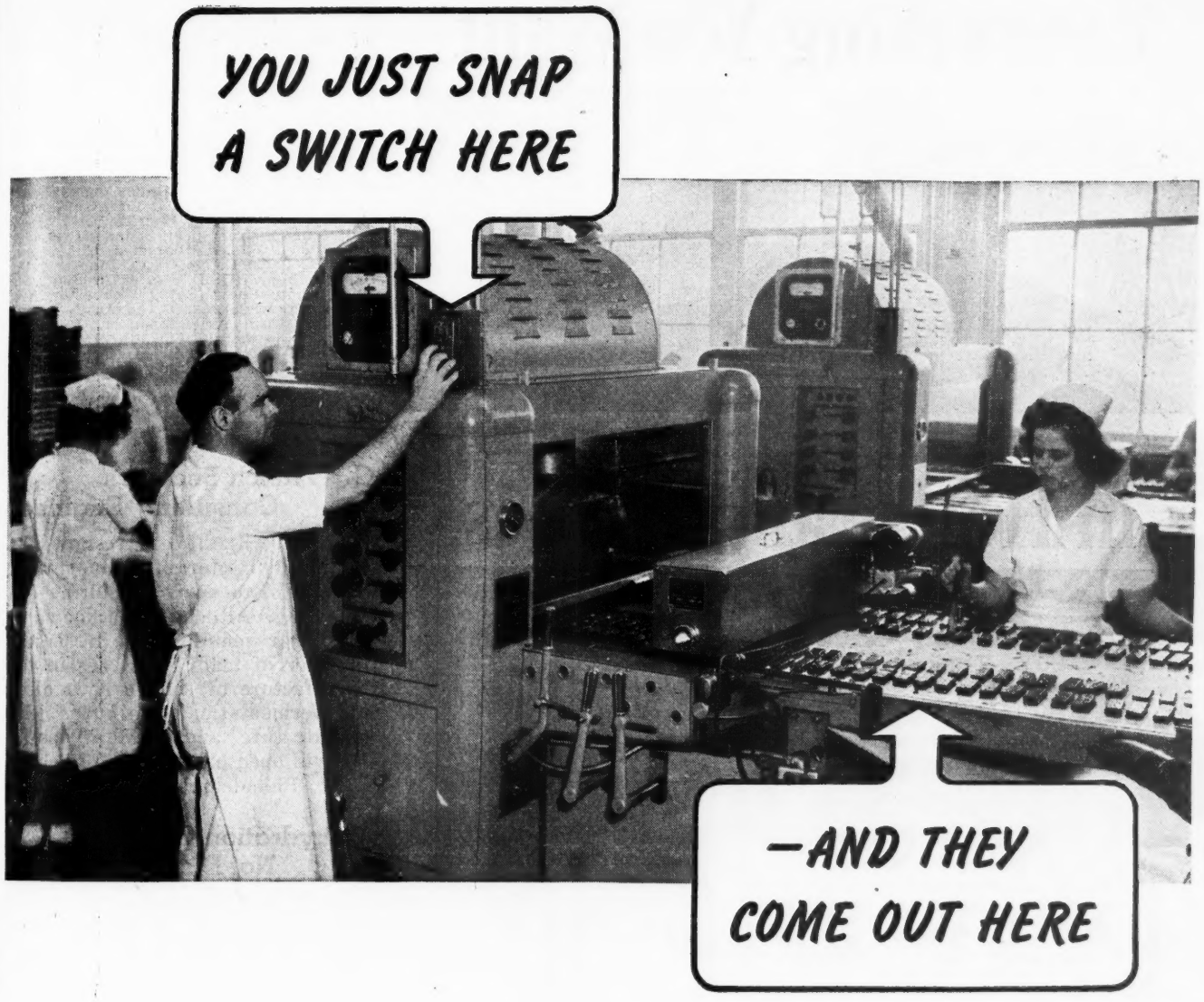
The new authorizations, in thousands of dollars, are as follows:

Canning (exclusive of dehydration), from 3,125 to 3,551; canning (inclusive of dehydration), from 3,775 to 4,290; cereal, from 2,500 to 2,750; dairy, from 7,000 to 9,000; meat, from 2,000 to 2,240; sugar, from 250 to 500; egg and poultry, from 1,500 to 3,000; confectionery, from 70 to 175; coconut shredding and processing, from 30 to 150; coffee, tea and spice, from 100 to 500; beverage, from 1,500 to 3,000.

Army Specifications

THE Quartermaster Corps has issued the following specifications. They are listed with the Chicago Quartermaster Depot number and date of issue.

Packing Dry Milk, Nonfat Solids for Civilian Feeding, C. Q. D. No. 368, May 16, 1945. Pickles and Pickle Relish, C. Q. D. No. 40A, May 18, 1944, Superseding C. Q. D. No. 40, May 12, 1942. 10-Grain Salt Tablets, C. Q. D. No. 159C, May 28, 1945, Superseding C. Q. D. No. 159B, Aug. 1, 1944. Dehydrated Apricots, C. Q. D. No. 304B, May 22, 1945, Superseding C. Q. D. No. 304A, Oct. 6, 1944. Canned Ham With Raisin Sauce, C. Q. D. No. 189B, Apr. 28, 1945, Superseding C. Q. D. No. 189A, Nov. 23, 1944. Powdered Egg, C. Q. D. 117B, Dec. 12, 1944, Amendment 1, May 14, 1945. Canned Boned Chicken or Turkey, C. Q. D. No. 34D, Apr. 28, 1945, Superseding C. Q. D. No. 34C, Feb. 24, 1945. Chop Suey (Soy), Worcestershire and Kitchen Sauces, C. Q. D. No. 370, Apr. 24, 1945. Ice Cream Mix, C. Q. D. No. 141B, Jan. 9, 1945, Amendment 1, May 4, 1945. Rolled or Flaked Oats, C. Q. D. No. 357, Mar. 13, 1945, Amendment 1, May 18, 1945. Packaging and Packing Assembly Type C Ration, C. Q. D. No.



HERE'S a setup that almost completely removes the "human element" from a very ticklish process — chocolate coating. Whether you're turning out biscuits, cookies, or candy bars as shown here, this Greer coating machine will put on the right thickness and quality of chocolate. We can speak with confidence because Taylor Fulscope Indicating Temperature Controllers have been standard equipment on Greer coaters for years. They assure the precise temperature control required.

Whatever product you are turning out today, or are contemplating for tomorrow, there's a Taylor Automatic Control System that will uphold your reputation for uniform quality—and what is just as important these days, save precious ingredients from being wasted. Taylor Field Engineers have a rich fund of experience in helping solve food processing problems with instrumentation. Consult our nearest branch office, or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

ARMY NAVY

Taylor Instruments

MEAN

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BUY ANOTHER WAR BOND TODAY!

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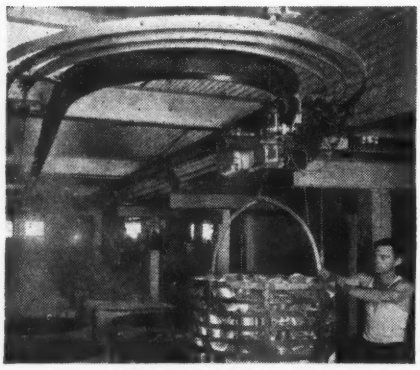
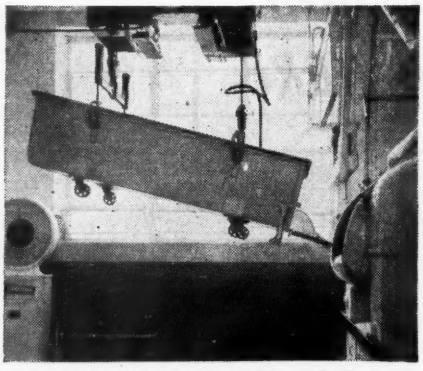
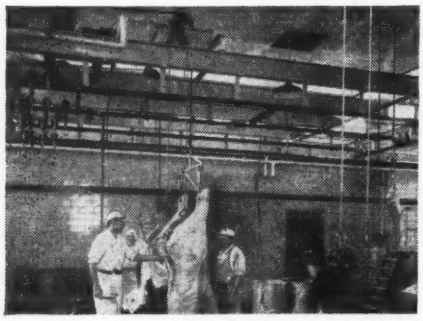


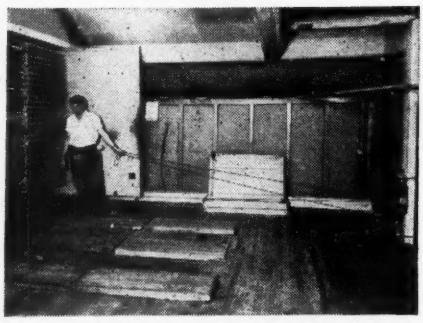
Type S½ electric hoist operating on loop track in low-headroom cannery.



Twin-hook bakery hoist lifts and tilts trough to make the dough flow.



Two Type HW heavy-duty hoists serve this packing plant dressing floor.



Wall-mounted Type S½ hoist pulls racks from heater at dehydrating plant.

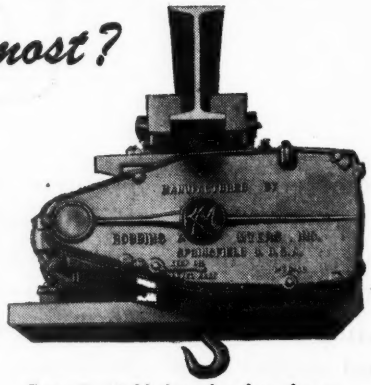
What do You want most?

Some folks put *dependability* first. They know from experience what uncertain performance can mean.

Others say *speed* gets their vote. Why have a hoist, they argue, that doesn't do the *time-saving job* it was bought for?

Good braking rates "tops" with operators on accurate handling work. They want loads to *"stay put,"* and you can't blame them. "Drift" is hard to estimate, often dangerous.

"Economy," say owners. "After all, we buy hoists to save money, and we're entitled to our money's worth."



Type F. Welded-steel safety frame; alloy-steel gear train; automatic load brake; push-button control.

The One Way to Get What You Want

Dependability, speed, performance, economy—rate them in any order you will, and you'll still come up with this one indisputable fact: The *best* hoist or crane for any job is the one that does *that job* best. That's why Robbins & Myers builds *hundreds* of standard models, why R & M specialists are so particular in *fitting* these "lifts" to the work, why R & M has been *first in the food field* for more than ten years. "Take It Up with R & M" is both good advice and good business. Sales and Service Headquarters in principal industrial centers. Send for literature, *today*.

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In Canada: Robbins & Myers Co., of Canada, Ltd., Brantford, Ont.

MOTORS • MACHINE DRIVES • FANS • MOYNO PUMPS • FOUNDED 1878

183B, Apr. 12, 1945, Superseding C. Q. D. No. 183A, Oct. 31, 1944. Canned Beans With Pork, C. Q. D. No. 51C, Mar. 27, 1945, Amendment 1, June 23, 1945. Canned Hamburgers, C. Q. D. No. 309A, May 28, 1945, Superseding C. Q. D. No. 309, Aug. 16, 1944. Frozen Fabricated Veal, C. Q. D. No. 371, June 12, 1945. Packing Dry Milk, Nonfat Solids, for Civilian Feeding, C. Q. D. No. 368, May 16, 1945, Amendment 1, June 22, 1945. Uncooked Wheat Cereal, C. Q. D. No. 372, June 19, 1945, Use in lieu of Federal Specification N-W-261a, Sept. 5, 1942. Bulk Corned Beef, C. Q. D. No. 42C, June 7, 1945, Superseding C. Q. D. No. 42B, Dec. 28, 1943, Used in lieu of Federal Specification PP-B-196. Dehydrated Peeled Blanched Clingstone Peaches, C. Q. D. No. 182B, June 4, 1945, Superseding C. Q. D. No. 182A, Sept. 30, 1944. Chop Suey (Soy) Worcestershire and Kitchen Sauces, C. Q. D. No. 370, Apr. 24, 1945, Amendment 1, June 27, 1945. Supplemental Hospital Ration, C. Q. D. No. 148A, Nov. 9, 1944, Amendment 2, July 4, 1945, Superseding Amendment 1, Nov. 28, 1944. Cocoa, C. Q. D. No. 316A, Feb. 23, 1945, Amendment 2, June 25, 1945, Superseding Amendment 1, Apr. 5, 1945.

G. T. Reich Becomes Consulting Engineer

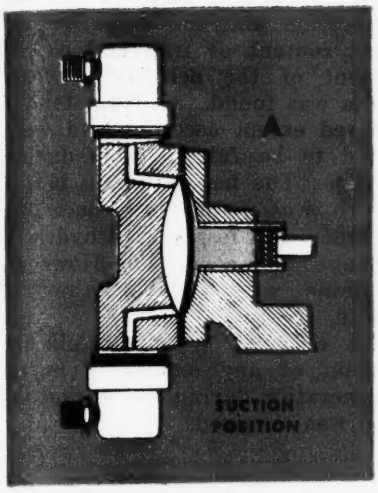
DR. G. T. REICH has resigned as technical director of Pennsylvania Sugar Co. to enter consulting engineering. Although well known in the sugar refining field, he is the inventor of many processes in the manufacture of solid carbon dioxide, fermentation, continuous jelly manufacture and waste disposal. He will open offices in the Packard Bldg., Philadelphia, this fall.

Dehydration Spoilage Not Due to Oxidation

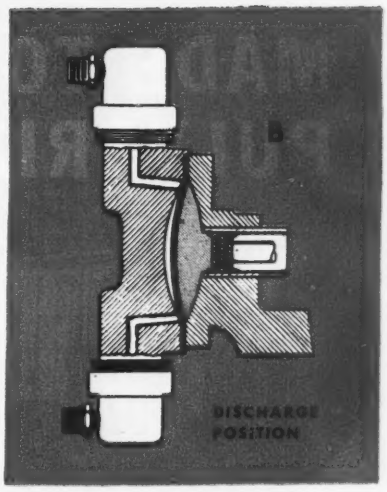
STORAGE deterioration of commercially dehydrated cabbage and potatoes is not due to the action of oxidative enzymes, whose presence might arise from inadequate blanching or regeneration during storage, according to a joint report issued by Cornell University, school of nutrition, and Columbia University, department of chemistry.

Commercially dehydrated cabbage, Irish potatoes and sweet potatoes were placed in controlled storage for one year under several conditions of temperature, moisture level and storage atmosphere. The fresh, blanched and dehydrated samples were assayed for vitamin, oxidative enzyme, "available" iron, total copper and moisture content. Similar analyses on the dehydrated samples were made several times during the storage period.

The dehydrated cabbage and potato samples showed extensive and rapid storage deterioration as evidenced by loss in vitamin C, discoloration and development of an off-odor when stored at temperatures higher than 70 to 80 deg. F., and at moisture levels above 7 percent in the case of the white potato. At lower storage temperatures the products were much more stable.



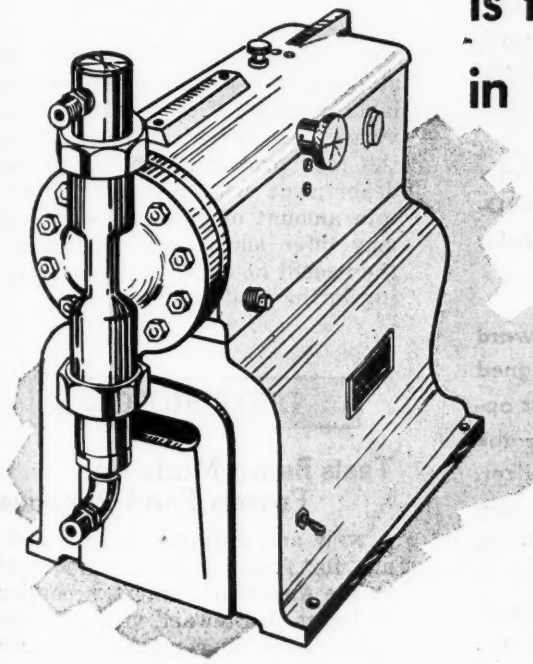
HYDRAULIC BALANCE in chemical proportioning pumps is exclusive with Wilson Pulsafeeders. The piston reciprocates a liquid medium interposed between the diaphragm and piston. This causes the diaphragm to react positively to every change in piston position. These diagrams are exaggerated to show piston-diaphragm action at minimum and maximum of the strokes. Actually the diaphragm-travel in small machines is barely perceptible. From a mechanical point of view diaphragm life is infinite.



Hydraulic Balance...

is the key to SUPERIORITY in WILSON PULSAFEEDERS

(CHEMICAL PROPORTIONING PUMPS)



WRITE FOR WILSON BULLETIN D-1144

Wilson Pulsafeeders move liquids positively. Operating on the principle of positive displacement, the Pulsafeeder embodies features which make it the most accurate liquid handling device known. Accuracies up to ⅛ of 1% are obtainable where required.

But accuracy without persistence would be of little value. It is their extraordinary persistence with accuracy that has won for Wilson Pulsafeeders the approval of laboratory, industrial, municipal and national government technicians all over the world.

Today, more Wilson Pulsafeeders are operating in remote placements where need for frequent servicing cannot be tolerated, as well as in near-by areas, than at any time in their 22-year history.

If you have a chemical proportioning requirement of any nature for laboratory, food processing, water purification, sewage disposal or industrial practice, send for our new folder of general information or, better still, detail your requirements so that we may give you specific information. Available in both high and low pressures, models up to 20,000 pounds per square inch . . . and for volumes from a few c.c.p.h. to 1000 g.p.h. Models also available for the compression of gases.

We also manufacture liquid filling machines and dry chemical feeders.

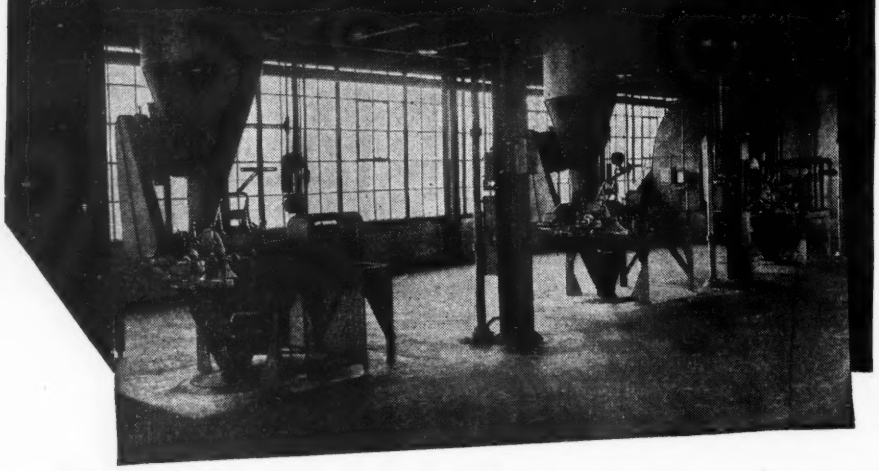
WILSON PULSAFEEDERS are known by the companies they keep in precision production

WILSON CHEMICAL FEEDERS, INC.

Established 1923 • With Experience in Allied Lines Since 1914

108 CLINTON STREET BUFFALO 4, N. Y.

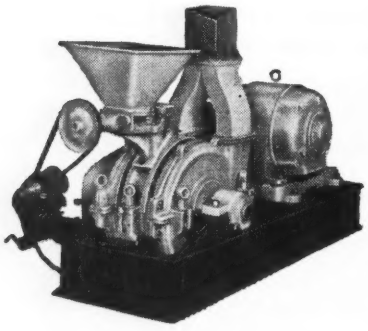
MADE TO MEET YOUR PULVERIZING NEEDS



Practically every pulverizing operation presents certain specific requirements which differ from those of another job. A soft, smeary, unctuous material is quite different to handle than a hard brittle product, or a tough rubbery substance.

Therefore, for best results the pulverizer used must be specially designed for each particular material. That is why every MIKRO-PULVERIZER is designed and built specially to meet the particular and peculiar requirements of each individual application.

It is true all MIKRO-PULVERIZERS have the same general outward appearance. Nevertheless, each mill is a special unit designed to give best results on the specific application for which it is intended—the only truly "custom-built" pulverizer. Research laboratory and test grinding facilities and service are available without obligation. Submitting to us a 5 to 50 lb. production test sample of your material with full details is the proper method of adequately meeting your pulverizing needs.



THE MIKRO-ATOMIZER
A new mechanical screenless unit for producing ultra-fine powders of 1 to 25 micron particle size.

Write for MIKRO-PULVERIZER book, MIKRO-ATOMIZER bulletin and Test Grinding Data Sheet.

PULVERIZING MACHINERY COMPANY
97 CHATHAM ROAD • SUMMIT, N. J.

NOW . . . 2 TYPES TO MEET MOST PROCESS JOBS

MIKRO-PULVERIZER (FINE)
MIKRO-ATOMIZER (ULTRA FINE)
Reg. U. S. Pat. Off.

No correlation between this deterioration and the oxidative enzyme content or iron and copper content of the dehydrated vegetables was found. All the vitamins assayed except ascorbic acid were found to be fairly stable during storage. The use of sulfite in the blanch was found to reduce the ascorbic acid losses in dehydrated cabbage during storage. However, thiamine was destroyed by the sulfite.

No evidence of any significant amount of any oxidative enzyme regeneration during the storage period was obtained.

Processors Foundation

THE College of the Pacific, Stockton, Calif., in cooperation with canners and other food processors, as well as machinery and equipment manufacturers, has established a Food Processors Foundation.

The primary purpose of the Foundation is to assist in training students for placement in control laboratories, offices and in supervisory and technical positions in the food processing industry. The department will undertake a certain amount of research work and may offer short unit courses for the benefit of employees now working in the food industry.

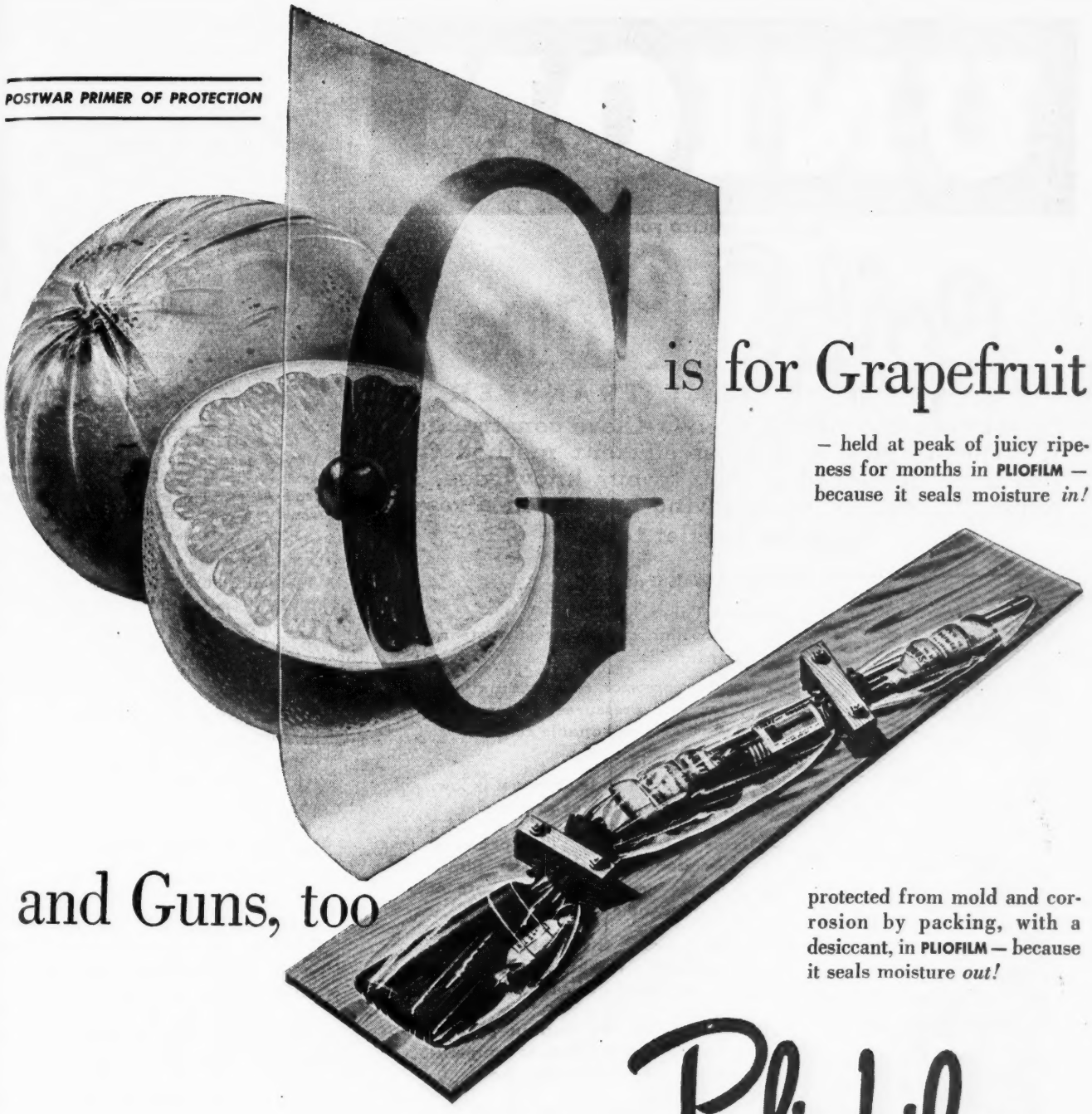
DISTRIBUTION

Tests Being Made on Frozen Food Package

A NEW and different type of package for frozen foods is under test by the American Can Co., according to James A. Stewart, vice-president in charge of the company's research and development. This package, which can be closed at speeds up to 200 per minute as against the present speeds of from 30 to 80, would materially lessen the cost of operations in freezing plants, Mr. Stewart said.

The company has just completed a pilot line on which a limited number of sample containers will be built this year for test purposes. These containers will be distributed to a representative number of packers of frozen foods to demonstrate in actual practice the results which the company has obtained in its laboratory tests. Furthermore, these tests will enable the packers to visualize the container in their own commercial operations, will permit both packers and the Ameri-

POSTWAR PRIMER OF PROTECTION



G is for Grapefruit

– held at peak of juicy ripeness for months in **PLIOFILM** – because it seals moisture *in!*

and Guns, too

protected from mold and corrosion by packing, with a desiccant, in **PLIOFILM** – because it seals moisture *out!*

SOON – we hope – many products will reach the public in better condition than ever before, surety-sealed against spoilage in **PLIOFILM.** ★ For wartime experience has proved that this gleaming transparent wrapping provides an impenetrable barrier to moisture – seals it *in,* or locks it *out* – keeps it where it belongs. ★ Best proof of that has been the military use of Goodyear's entire **PLIOFILM** production on airplane engines and other military items, to protect them from corrosion in transit overseas. ★ That is why none can yet be spared for marketing tree-ripened fruits out of season – or to keep cigars moist, drugs dry and foods fresh. ★ But that day is coming, and alert manufacturers are already designing new **PLIOFILM** packages that will safeguard the quality of their products at point of sale. For information, write Goodyear, Chemical Products Division, Pliofilm Sales Dept., Akron 16, Ohio.

Pliofilm

A PRODUCT OF GOODYEAR RESEARCH

GOODYEAR

THE GREATEST NAME IN RUBBER

KEEP BUYING WAR BONDS—FOR KEEPS

Pliofilm—T.M. The Goodyear Tire & Rubber Company

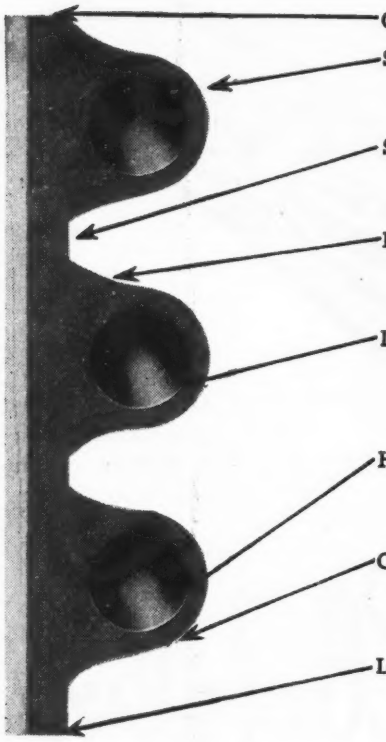
UNION

PATENTS APPLIED FOR

Coil-O-Clave

SYSTEM OF HEAT TRANSFER

Investigate the use of Coil-O-Clave construction. It's the simplest and most efficient method that has been developed so far, to our knowledge, for applying heat to, or removing heat from a vessel. Write for booklet today.



Clad Wall if desired.

Steel Tubes. For high or low pressure steam or liquids.

Steel or corrosion resistant material for any pressures or temperature at a reasonable cost.

Integral Weld. Resistance to heat travel is low. Ample metal area provided.

Large Film Area. The principal resistance is thru the film—ample area for a high rate of heat transfer.

High Velocity thru the tubes reduces film thickness and results in high rate of heat transfer.

Coils can be arranged in parallel groups to give uniform temperature over entire vessel area.

Light weight of wall results in low heat storage and sensitive heat control.

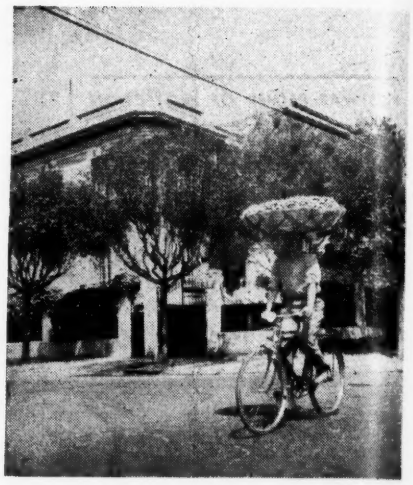
For Heating or Cooling Autoclaves or Process Vessels

—Write for Booklet—

UNION IRON WORKS, ERIE, PA.

PRESSURE VESSELS

STEAM GENERATING EQUIPMENT



(*Wide World*)

DISTRIBUTION HEADWORK

All you need to distribute baked goods in Mexico City is a bicycle and a steady head. At least that is what this photograph would lead one to believe.

can Can Co. to conduct larger experiments and tests, and will determine the actual sizes of containers which will be required for the various products now frozen.

The container is an oblong composite fiber-metal can resembling the conventional frozen food carton in shape. The walls, however, are made of paraffin-impregnated fiberboard, and the ends are of light weight tinplate.

Quick Frozen Milk

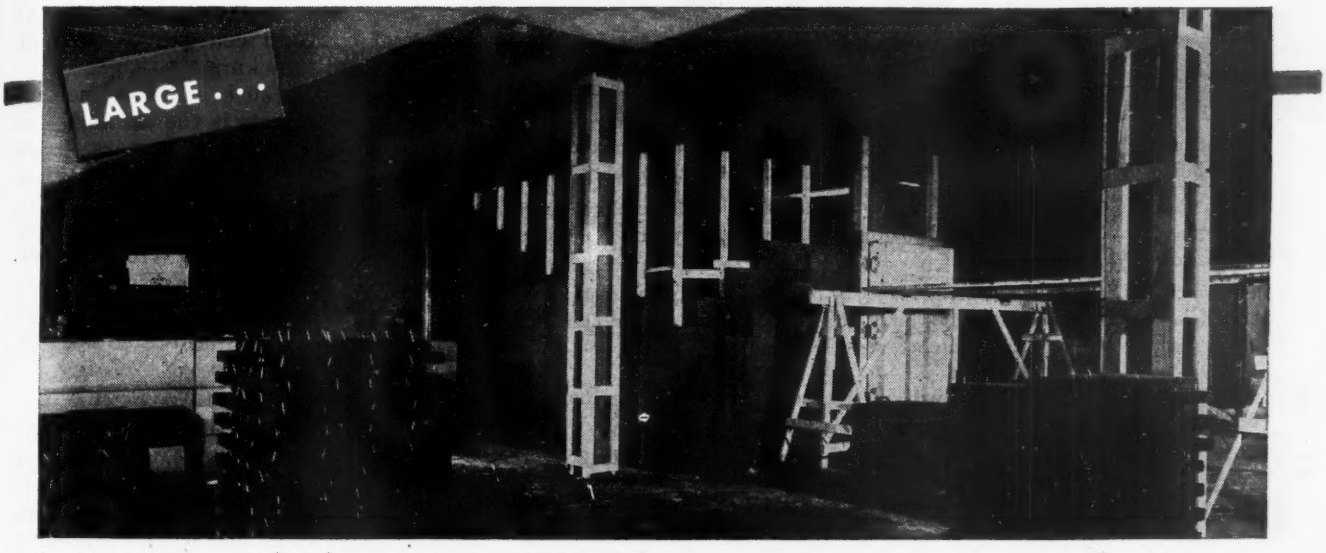
QUICK-FROZEN milk (Food Industries, July, '44, P. 76) has replaced dried whole milk powder on Army and Navy hospital ships, and may soon find expanded uses for both military and civilian purposes, the Department of Agriculture reports. The report asserts that the frozen product is superior to dried milk because the latter does not approach the taste of the original product, while frozen milk does. Research into commercial uses are now being conducted by the department.

Promotion Fund

PLANS for a two year advertising, publicity and promotion campaign on commercial jams, jellies and other forms of preserves were announced today by Richard Glaser, chairman of the Preserve Industry Council, newly formed promotion group for the industry. Mr. Glaser is president of Glaser-Crandell Co., Chicago.

The industry is raising $250,000 a year for two years. The intention is to continue the campaign indefinitely, if the first two years are successful. More than half the funds have already been pledged.

How to hold low temperatures efficiently in any cold room



▲ Cold storage room 102′ x 51′ under construction for Rubenstein Produce Co., Dallas, Texas. About three carloads of Armstrong's Corkboard were used on this job, which includes a sharp freezer insulated with 8″ of corkboard on the outer walls and 6″ corkboard partitions inside.

NO MATTER whether your refrigerated space is a giant cold storage warehouse or a small cooler room, you can be sure of economical operation over the years if it is insulated with Armstrong's Corkboard, erected according to Armstrong specifications by Armstrong's Contract Service.

Armstrong's Corkboard is a highly efficient heat barrier that is naturally moisture resistant. Armstrong's specifications embody the best practice developed during its 40 years' experience. And Armstrong's nation-wide Contract Service includes: (1) practical engineering help, (2) dependable materials, and (3) installation by trained, skilled mechanics. For full information about this triple service, write today to Armstrong Cork Company, Building Materials Division, 4208 Concord Street, Lancaster, Pennsylvania.

▲ Chill room in the Elk Street Market Terminal, Buffalo, N. Y., insulated with Armstrong's Corkboard. Note 2-layer construction, with staggered joints, and erection of corkboard in hot asphalt. One wall is a 2-layer solid corkboard partition.

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service For All Temperatures

From 300° Below Zero

To 2600° Fahrenheit

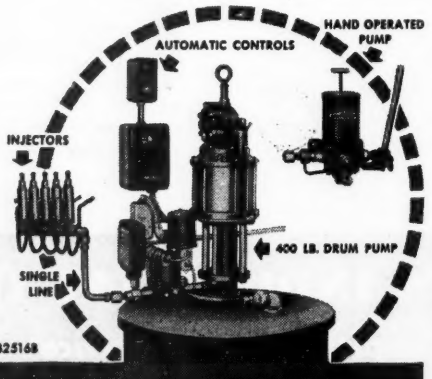
To Those Responsible for Maintenance... facts- about LINCOLN Single-line CENTRO-MATIC LUBRICATING SYSTEMS

The demand for efficient and unfailing production has emphasized the need of adequate lubrication methods for plant machinery and equipment.

Today's accelerated pace has brought out the inadequacies of the older, time-consuming methods of lubrication and the importance of investing in positive centralized lubricating systems.

Everyone responsible for the maintenance of plant machinery and equipment should investigate the outstanding merits of Lincoln Centro-Matic Lubricating Systems. A few facts are given below—

1. Lincoln Centro-Matic Systems will dispense either oil or grease.
2. Will dispense a pre-determined, measured quantity of lubricant, unaffected by temperature or viscosity changes.
3. Lubricant is delivered through an injector to each bearing at maximum line pressure regardless of location on the machine.
4. Injectors are easily adjusted for the desired output — no special tools needed.
5. Each injector is provided with an external indicator.
6. A complete range of lubricant pumping units adaptable to the bearing requirements of a single machine or a battery of machines. Pneumatically, electrically or manually operated.
7. Centralized or zoned systems pumping lubricant from an original refinery container and supplying lubricant automatically at fixed time intervals.
8. All pumping units are of proven design and incorporate features that have been used on Lincoln lubricant pumps that have served dependably in automotive, agricultural and industrial applications.
9. Systems can be installed so that lubrication can be effected by the operator either by operating a manual pump, opening a valve on a common lubricant line under pressure, or from a time-controlled central source.
10. Easy to install. Only one supply line is needed.
11. Any injector in a manifold can be removed for inspection without disturbing line connections or other injectors in the manifold.
12. Special Linpak packing eliminates metal-to-metal seals. This maintains accuracy and gives longer service life.
13. The facilities of Lincoln Engineering Company are devoted exclusively to the manufacture of lubricating equipment.
14. A staff of experienced lubrication engineers is ready to assist you in all lubrication problems.



Check these facts — compare them with other systems and you will understand why Lincoln Centro-Matic Systems are being used in all types of industrial applications.

Write for Literature Today

LINCOLN
Pioneer Builders of Engineered Lubricating Equipment

Future for Dry Milk Indicated by Survey

AFTER a consumer acceptance and retail distribution survey on whole and non fat dry milks in the Houston, Tex., area, the Bureau of Agricultural Economics concludes a policy of aiming for special markets is indicated. This would mean, says the report, the stressing of distinctive qualities, such as the economy and convenience of both types for cooking.

Favoring such a development of special markets is the suitability of the products for campers, labor gangs, and others remote from sources of fluid milk supply. The nonfat solids are suited to persons dieting to lose weight or with digestive systems sensitive to fats. The economy of the products also suggests use in school lunch programs.

Chocolate Exports

ARGENTINA reports on expansion of its chocolate exports, which in 1943 reached 1434 tons, 70 times the amount exported in 1938. Because of a rise in local demand, however, exports dropped to 1136.6 tons in 1944 and were continuing on the down grade during the early months of this year. The largest Argentine supplier of export chocolate was the firm producing "Aguila," a product composed of 50 percent sugar and 50 percent chocolate, which, they say, has a particularly wide appeal in times of war.

Half Million for Candy

THE Council on Candy's drive to raise $500,000 this year to finance the industry's cooperative advertising and educational program until June 30, 1946, passed the $300,000 point at the halfway mark in the 1945 calendar.

Food Containers

ALTHOUGH containers of all kinds remain in tight supply, some easing was noted during the past month when restrictions on the manufacture of fluid milk shipping containers and covers by specification and steel content were removed by WPB. These restrictions were removed by revocation of M-200. Quota restrictions on new fiber shipping containers for food products were also eased by making the quotas, with few exceptions, interchangeable for all foods. On the other hand, all manufacturers who use the contents of tin cans are re-

Yours for the asking

it tells how to measure fumigation results!

Here's a new leaflet—hot off the press—that carries an important message to every user of fumigants. It explains and illustrates a simple, quick method of measuring fumigation results regardless of the fumigant used. It tells you how to determine whether *all* of the pests in *all* of the hiding places have been killed. The test is made in a few moments and costs practically nothing.

Recent studies prove the importance of being sure that a complete kill has been obtained during a fumigation. Such research indicates that survivors are the main source of reinfestation—rather than new arrivals brought in with incoming supplies.

That's why so many leading concerns are specifying Dow Methyl Bromide as the fumigant to be used. Tests prove that this penetrating fumigant accomplishes a complete kill of insects buried in the heart of a 140-pound bag stacked in a large pile.

Make sure that your fumigations are efficient—that you are getting your money's worth. Write today for this free booklet, "How Effective Are Your Fumigations?"

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle

The penetrating fumigant

Methyl Bromide

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND VICTORY

Keep down Production Costs with

Tight Valves ON AIR, STEAM, AND WATER LINES

Efficient Lubrication OF BEARINGS

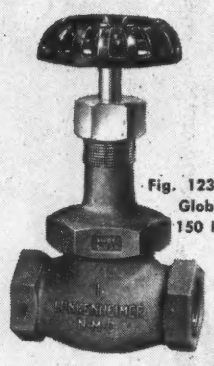


Fig. 123, "N-M-D" Globe Valve 150 lb. S. P.

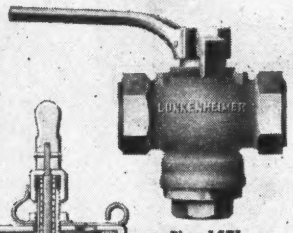


Fig. 1571 Air Cock 150 lb. Pressure

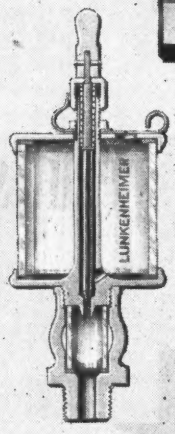


Fig. 1300 "Sentinel" Oil Cup with Sight Feed

Fig. 1815 Bottle Oiler

Fig. 1834 "Alvor" Constant Level Oil Control

Leaky valves, permitting the escape of steam, air, or water, are wasteful in themselves—doubly wasteful in their effect on production costs and operating efficiency.

Inadequate, hand-method lubrication is another cost booster . . . increasing expense of machinery repair, of lubricant, of inspection time.

And—ultimately—*both* leaky valves and inefficient lubrication mean a *waste of fuel.*

Lunkenheimer Valves and Air Cocks have a rugged durability and simplicity of design that makes them *stay tight* with the very minimum of maintenance . . . Lunkenheimer Automatic Oilers feed the right amount of oil, in the right way, at the right time, to the right place . . . These and other Lunkenheimer products are famous for their outstanding performance record.

The Lunkenheimer Co., Cincinnati 14, Ohio, U.S.A. (Branch Offices: New York 13, Chicago 6, Boston 10, Philadelphia 7. Export Department: 318-322 Hudson St., New York 13, N.Y.)

A Lunkenheimer Distributor is located near you, fully equipped to assist with your maintenance and operation problems. Call on him.

LUNKENHEIMER VALVES & LUBRICATING DEVICES

quired to adopt tin can salvage measures by an amendment to M-325. The used tin cans must be properly prepared for salvage and delivered to the local salvage collection authorities or tin scrap collection dealers, according to WPB.

Cold Storage Curbs Eased in 25 States

A HOPED-FOR result of the recent order relaxing storage restrictions in 25 states is the movement of frozen fruits and vegetables to the interior of the country, where at no time will the demand for cold storage space be as great as in the port areas on the coast.

The War Food Administration's move, made June 29, carries out the claim that controls would be relaxed whenever possible. The restrictions were removed for the summer period when it is desirable to place in storage some foods that do not need to occupy cooler space in the other seasons of the year.

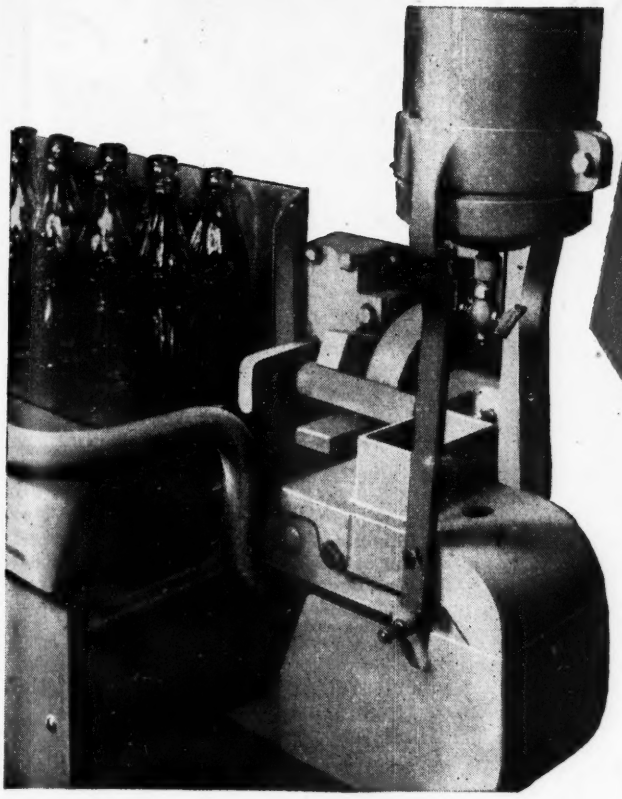
"Restricted, limited-storage, and ceiling inventory items may be stored without permit in the area affected for 90 days from the date of the order, unless the suspension period is reduced to 60 days by an announcement prior to August 15, 1945." This 60-day provision is an escape clause which officials do not expect to use.

RAW MATERIALS

Farm Products Being Speeded to Processor

FARM to processor movement of raw material and other farm production is being speeded this year by the Office of Surplus Property, Department of Commerce, and the Agricultural Adjustment Agency, U. S. Department of Agriculture, in close cooperation with the Surplus Property Board by making trucks which are surplus to the needs of the Armed Forces available to farmers and farmer's cooperatives in those areas where a shortage threatens to impair farm production.

The heavy peach producing area in South Carolina, where the crop this year is approximately twice 1944 production, was the first to benefit under the new program. Seventy-four trucks were allocated by the Surplus Property Board and subsequently sold by the Department of Commerce at a spot sale, June 26, to dealers who agreed to sell within the peach area and only to purchasers certified by the Agri-



NEW LUBRICANT
PREVENTS CORROSION ON CHAIN CONVEYORS

A simple container equipped with needle valve and petcock automatically dispenses Botlube

How Turco Surface Chemistry Solved the Problem of Corrosion in High-Speed Pre-Mix Bottling Units*

Lubrication of ordinary bottling machines by soap has never been particularly satisfactory or efficient. But when operators tried to use soap on the new high-speed, pre-mix bottling units—particularly those where all chains return to the same gear box—the result was completely discouraging—repeated shut-downs, costly repairs, caused by corrosion.

Turco chemists were, as they often are, handed the problem. The result was BOTLUBE.

Through *Surface Chemistry** Turco men developed a non-staining, soapless, oil-less, non-corrosive lubricant that not only cleared up all the trouble with the new high-speed, pre-mix equipment, but which also worked better than any previous lubricant on even the oldest bottling units. This new lubricant is called BOTLUBE.

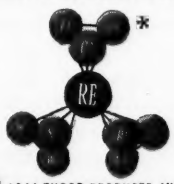
Turco BOTLUBE has tremendous wetting action—one drop will quickly cover an unbelievably large area with a thin but exceptionally durable film. Thus there is no overflow, no spillage, no unsanitary soap pools on the floor. Moreover, such BOTLUBE as may adhere to the bottoms of bottles will not stain surfaces on which the bottle later may be set.

BOTLUBE is automatically dispensed through almost any simple container with a petcock and needle valve (*see illustration above*).

A demonstration in your own plant will quickly show you how Turco chemists have licked another of the Industry's problems through application of the principles of *Surface Chemistry.**

Write for free demonstration, or for full information on Turco BOTLUBE. Address Turco, Dept. F.I.-8.

A product of Surface Chemistry



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Surface Chemistry is the scientific balance and application of these cleaning factors to a specific problem.

WA—Wetting Action
EA—Emulsifying Action
SV—Saponifying Value
SA—Solvent Action
CA—Colloidal Activity
WC—Water Conditioning
BI—Buffer Index
PH—Energy of Alkalinity
TA—Total Alkalinity
RE—Research and Experience, the combining factor that puts all the above elements into balance and to work on your specific problem.

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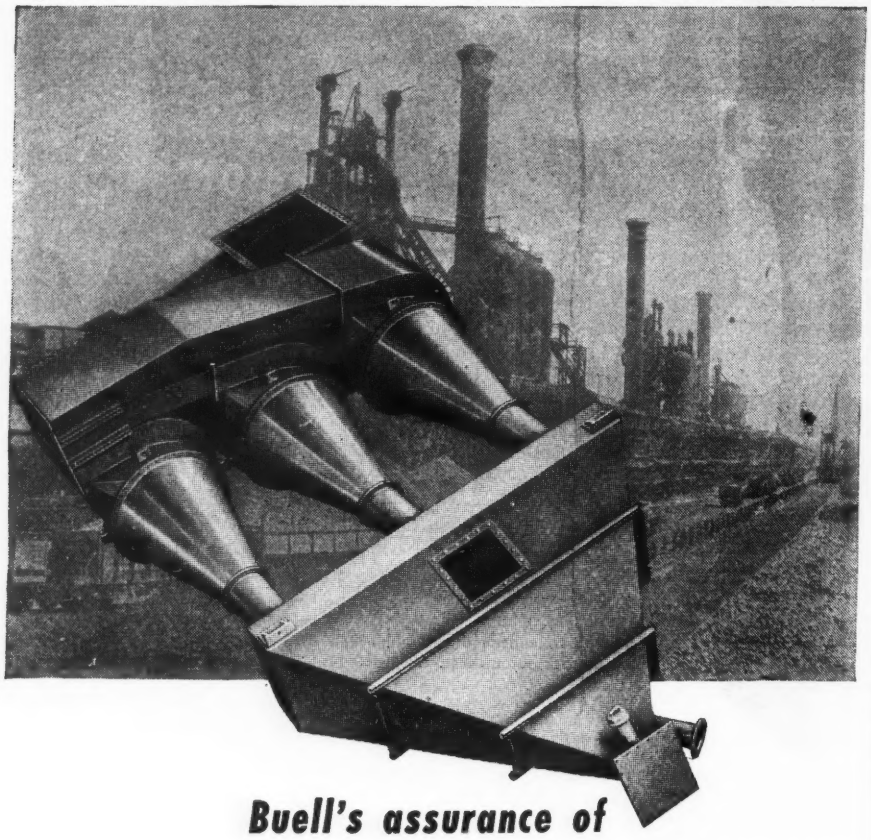
Correct HOPPER DESIGN



Buell's assurance of

HIGH EFFICIENCY, LOW MAINTENANCE, LONG LIFE

TOO OFTEN OVERLOOKED by engineers and operating men is a mechanical feature of *first importance* in the efficient collection of dust: *correct hopper design.*

For example, the correct slope for the particular type of dust collected is an essential engineering "must".

With correctly engineered slopes precisely calculated to overcome any "angle of repose", Buell's overall hopper design and specifications ensure unfailing facility of disposal.

Every Buell hopper sustains the enviable reputation Buell (van Tongeren) Dust Recovery Systems have acquired through efficient dust collection in a widely diversified field.

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LARGE DIAMETERS
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CORRECT HOPPER DESIGN
SPLIT-DUCT MANIFOLDS
INNER WELDS GROUND SMOOTH

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HIGH COLLECTION EFFICIENCY
LESS FAN BLADE WEAR
LOW DRAFT LOSS
LOW POWER CONSUMPTION
HIGH TEMPERATURE RESISTANCE
UNLIMITED CAPACITY
NO MOVING PARTS
FREE DUST FLOW

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LOW OPERATING COST
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DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

(*Wide World*)

VOLUNTEER WORKERS

Harvesting and processing of a large portion of the country's food supply will depend again this year on volunteer workers. In this picture, volunteers are gathering cherries near Beaumont, Calif.

cultural Adjustment Agency of the U. S. D. A.

Other supplies of trucks have been recently authorized to aid in the conservation of wheat in Washington, Oregon, Idaho and Montana; potatoes in New York and Maine; truck crops in Maryland, Delaware and Virginia; asparagus and strawberries in Michigan; and canning peas in Wisconsin.

Additional allocations are expected under provisions of the new program for the production and transportation of tomatoes, citrus fruits, small grains, rice, peanuts, milk, crimson clover seed, hay and feed for cattle.

The administrative setup of the program provides for quick action in the channeling of trucks into those areas where crop impairment is threatened. Office of Surplus Property Regional Offices informs Agricultural Adjustment Agency liaison representatives daily of the declarations of surplus trucks in their regions. Local AAA Offices at all times have current information on production conditions in their regions and notify the Secretary of Agriculture of any probable crop impairment from truck shortages.

The Secretary of Agriculture then certifies to the Surplus Property Board that food production is threatened and recommends the quantities of trucks which should be channeled to the designated area to prevent crop loss. Allocations of trucks are then made by the Surplus Property Board and sales are arranged by the Department of Commerce, surplus property disposal agencies.

forget infestation worries

use a control program specifically designed for *your* needs

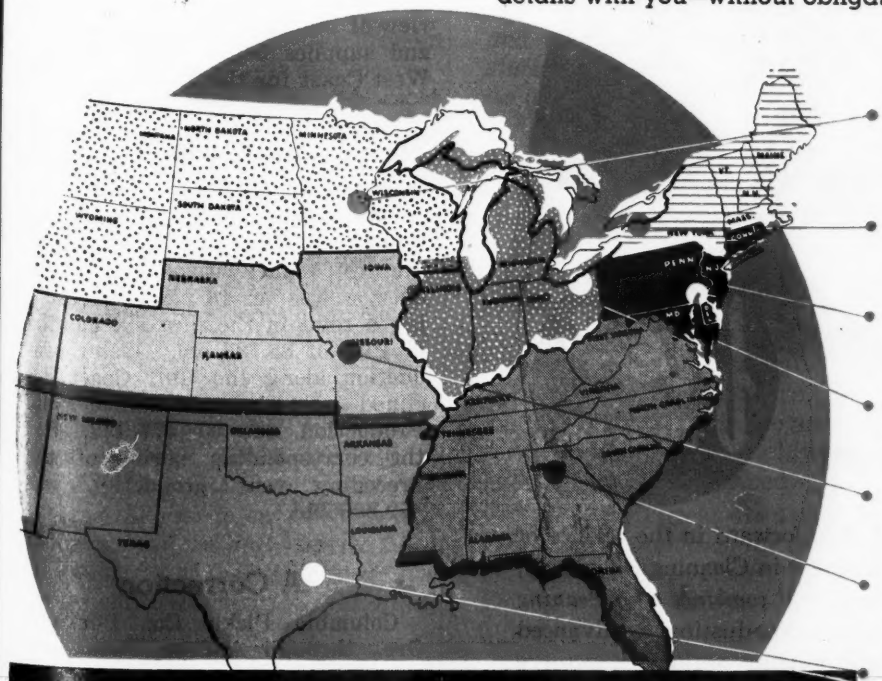
Keep infestation at a minimum *at all times*—rely on the Year 'Round Pest Control Program. Here are a few of its advantages to all fumigation users:

1 **CONSTANT CONTROL.** Instead of an occasional clean-up, continuing control measures enable you to forget your pest problems—infestation is kept at a minimum every day of the year.

2 **TAILORED TO YOUR NEEDS.** Conditions existing in your plant are studied and analyzed by a competent fumigation engineer. He makes a written report recommending the best control methods under those specific conditions.

3 **LOWER COSTS:** This new and better plan actually costs you less for several reasons . . . unnecessary travel by fumigation crews is eliminated—the job is handled by the outfit nearest your plant or branch although you deal only with the fumigator in your contracting district . . . purchasing power is increased—a saving passed on to you . . . and, because the periods between fumigation are probably greater, you have fewer shutdowns and less spoilage.

4 **SPONSORED BY LEADING FUMIGATION ENGINEERS.** A leading and responsible fumigation engineer in your territory is ready to discuss details with you—without obligation, of course.



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YEAR 'ROUND PEST CONTROL PROGRAM

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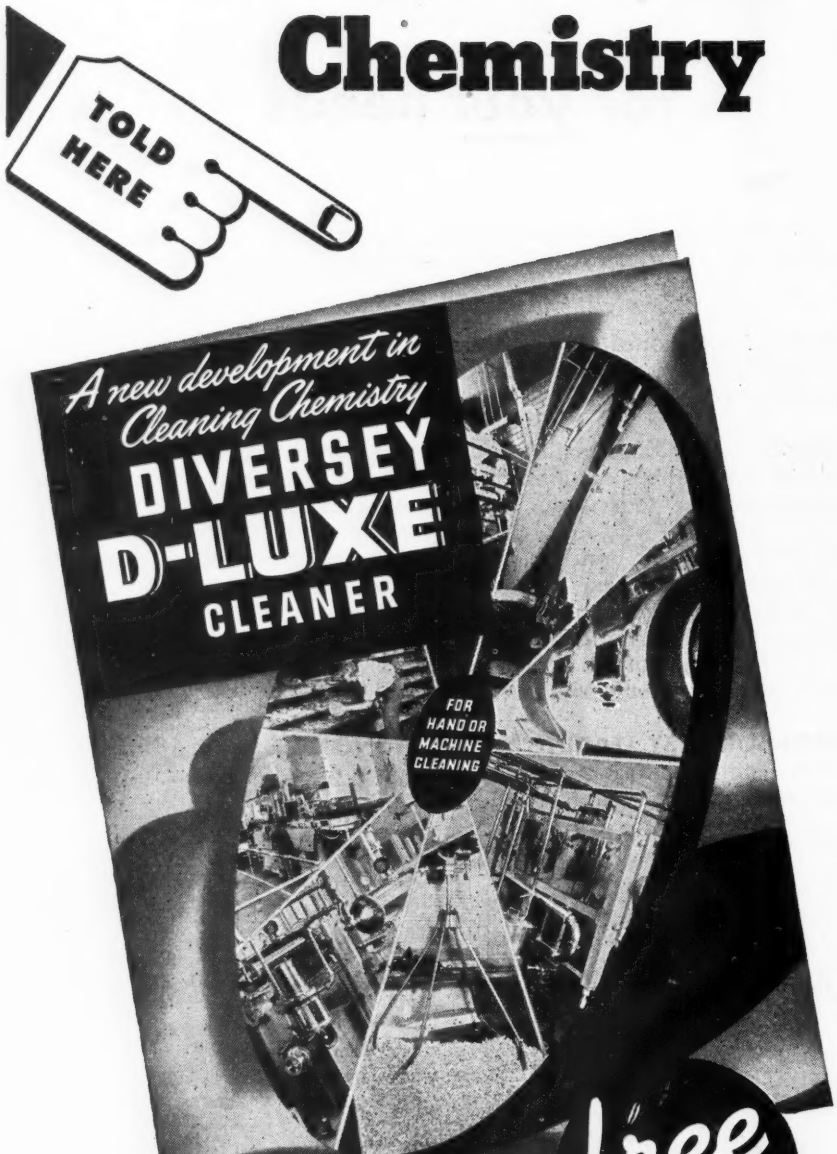

COMPLETE DETAILS GIVEN IN

Diversey D-Luxe marks a distinct step forward in the science of food plant sanitation. A new development in Cleaning Chemistry, D-Luxe gives remarkable results because it *combines all 8 cleaning essentials* in one product: 1, free flowing, non-dusting; 2, advanced water-softening action; 3, powerful wetting action; 4, reserve strength; 5, emulsifying and dispersing power; 6, fast and complete rinsing; 7, easy on hands and equipment; 8, economical to use. Free bulletin gives complete details. Write today to **The Diversey Corporation, 53 W. Jackson Blvd., Chicago 4, Ill.**

Commerce Department spokesmen point out that the program is not designed to replace trucks for individual requirements but is for the purpose of preventing the loss of large amounts of food and feed of vital importance to the war effort, due to a shortage of transportation.

POW Labor Assigned For Harvest Season

ABLE-BODIED German prisoners of war will be kept in this country as long as American manpower is not available to replace them in essential work, the war department has declared. Major General Lerch, provost marshal general, said that about 155,000 of the more than 400,000 held here on June 1 would be assigned to civilian duties during the peak of the agricultural season.

The Department of Agriculture states that 100,000 have been assigned for the harvest season. This presumably leaves 55,000 for work in the food processing plants, although figures were not available in mid-July.

One of the principal problems in assigning POWs is transportation. The greatest number of prisoners are now in the west, where they will not be needed until fall. There is no problem in moving the POW labor east for the peak canning season, but the Army does not see how they can be taken west again, in view of the tremendous load of men and supplies being carried to the West Coast for the Jap war.

Shrimp and Oysters

GULF COAST fisheries showed a decided gain in output during the first half of 1945 as compared with the first of last year. Shrimp production was up 16 percent, reaching a total in the first six months of 1945 of 85,183 bbl. Oyster production along the Gulf Coast declined during the first half of 1945. Production was 395,477 bbl. For the corresponding period of the preceding year production was 459,306 bbl.

A Correction

Columbia Pickle Co., Portland, Ore., through Andrew Fasio, secretary, announces that published reports that the company has been acquired by Hunt Foods, Inc., "are without foundation." The business has not been offered for sale, nor is there any intention of selling, according to Mr. Fasio's denial.

MORE FORD TRUCKS ON THE ROAD • ON MORE JOBS • FOR MORE GOOD REASONS

TRUCK-ENGINEERED **Reliability!**

"We'll Take Fords the Year 'Round"

ABILITY to stay on the job—in any weather—is one big reason why Fords are the most widely-used trucks in America.

Mr. W. W. Cease, of Cease Lunch Systems, Dunkirk, N. Y., knows Ford reliability at first-hand. He writes:

"Two storms hit the Buffalo area, bringing five and a half feet of snow, and the worst road conditions on record. Despite this, our Fords were among the first to get through, and have maintained daily service since then. Many of these trucks are five years old, with over 100,000 miles, and have been in constant daily use since Pearl Harbor. Rest assured we will order Fords when we place our postwar orders. We'll take Fords for year 'round performance."

Fords perform like this because they're built to stand up, to keep going, and to be thrifty of gas, oil, and tires. Check the Ford features listed and you'll know this is true. Special alloy steels and special manufacturing processes give Ford Trucks added endurance. And, when repairs finally are needed, service and parts are readily available, economically priced.

New Ford Trucks are available, in limited quantities, for essential civilian use. See your Ford Truck Dealer without delay.

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A STILL GREATER 100 HP V-8 ENGINE with NEW Ford steel-cored Silvaloy rod bearings, more enduring than ever in severe service • NEW aluminum alloy cam-ground pistons with 4 rings each, for oil economy • BIGGER, more efficient oil pump and IMPROVED rear bearing oil seal • NEW rust-proofed valve springs • NEW efficiency in cooling • in carburetion • in lubrication • Far-reaching ADVANCEMENTS in ease and economy of servicing operations.

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Hermetically sealed mercury switch is used. They cannot be affected by dust, dirt or corrosion; nor are they subject to open arcing, oxidation, pitting or sticking of contacts, all common causes of contact trouble. This switch will give better control service and longer control life.

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The Bourdon tube is the actuating element of the control. It is the oldest known, tried and proven element, having been used in gauges for many years.

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The outside double adjustment with the calibrated dial and pointers is a convenient feature, making it very easy to set the required operating range, plainly visible on the dial. All guesswork is eliminated.

GLASS FACE
The glass face on the cover permits seeing the entire operation of the control in plain view. One can always tell whether the switch circuit is open or closed, a great convenience whenever servicing becomes necessary.

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INDICATORS

Production

Beef, veal and lamb production in Federally inspected packing houses in June was about the same as for the preceding month, while pork production was 3 percent greater than in May, American Meat Institute reports. Compared with June, 1944, beef and lamb were 12 and 9 percent greater, respectively. Veal and pork production were 25 and 34 percent less, respectively, than a year ago.

Flour milled during June totaled 15,899,833 sacks, representing 73 percent of total United States output, *The Northwestern Miller* reports. This is higher than the 13,223,048 sacks milled in June, 1944, but lower than the 16,360,281-sack production of May, 1945.

Peanut cleaning and shelling production set a record during the current crop year. The total volume of farmers' stock peanuts cleaned and shelled by mid-year had reached nearly 1,400,000,000 lb. since the start of the season on September 1. This is 20,000,000 lb. more than the previous record for the full crop year 1943-44.

Creamery butter production in May was estimated at 160,685,000 lb., the lowest for the month since 1928, 16 percent below the 10-year average and 6 percent lower than May last year.

American cheese output in May is placed at 106,920,000 lb., 13 percent more than in the corresponding month of 1944. Cumulative production for the first five months of 1945 was 358,202,000 lb., 15 percent more than in the same period of last year.

Canned fishery products and by-products in 579 plants in the United States during 1943 totaled more than 2,200,000,000 lb., valued at over $200,000,000. Products canned amounted to 620,081,000 lb., valued at $141,156,000. Liver oils were valued at $14,842,000; other oils, at $14,971,000; fish and meal scrap, at $13,629,000; and other products, at $15,694,000.

Materials

Corn production forecast for this year is a bad spot in an otherwise favorable domestic crop outlook. Slightly less than 2,700,000,000 bu. is indicated, about half a billion bushels less than in 1944 and well below the high level of the last three years. This expected decline in corn production will bring the output of feed grains below the record volumes of the three previous years, although there is expected to be enough feed.

Wheat production this year is forecast at an all-time record level of 1,129,000,000 bu.

Total crop production in 1945 will not set a record but will be well above average. There is expected to be important increases in food grains, sugar and flaxseed, while big crops of potatoes and several other vegetables and fruits are expected.

Cottonseed output does not look promising, the indicated acreage of cotton being the lowest in 60 years. The amount in cultivation on July 1 was placed at 18,355,000 acres, 2,000,000 less than last year and 30 percent below the 10-year average.

Pigs produced this spring totaled only 51,687,000, or 3,741,000 fewer than in the spring of 1944 and some 22,247,000 less than in the spring of 1943.

Milk production of record proportions is in prospect in 1945 and is likely to continue at a high level next year. For the first five months of 1945, production totaled 50.9 billion pounds, 1.7 billion above the same period of 1944.

Fats and oils stocks on May 1 were the lowest for that date in many years and will decline seasonally until crushing of 1945 crops of oilseeds gets under way this fall.

In Storage

Frozen fish and shellfish stocks increased about 8 million pounds during May to 40,515,622 lb. on June 1. This was 29,176,036 lb. less than the stocks held on the same date in 1944 and 13,148,187 lb. below the 5-year average for the date.

Indexes

Business activity index of *Business Week* was 219.8 for the week ending July 14, compared with 223.6 a month earlier and 235.0 a year ago.

Cost of living index of National Industrial Conference Board for June stood at 106.9. A month earlier it was 106.4; a year ago, 104.6.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded July (thousands)	Total Awarded 1945 (thousands)
Bakery	$ ...	$ 40	$ 353
Beverages	310	280	442
Canning and Preserving	...	...	1,100
Cold Storage	647	195	1,968
Confectionery	...	...	150
Grain Mill Products	522	285	2,625
Ice, Manufactured	...	91	451
Meats and Meat Products	150	...	522
Milk Products	420	308	2,546
Miscellaneous	580	870	9,282
Complete			
1945 total	$2,629	$2,069	$19,439

AN AMERICAN INSTITUTION WORKING WITH AND FOR AMERICA

PACKAGING by NATURE

During earliest infancy, beginning with the seedlings of "grown-ups" to be, Mother Nature clothes her progeny in protective coverings. Throughout maturation to harvest, the many enemies of growing things are held at bay by nature's own armor of pod, peel and shell. But comes the day when processing takes place, when edibles are transmuted into countless marketable forms and introduced into new environments. Then Mother Nature can no longer stand sentry, and her guarding hand is lifted. Vulnerable food products now require man-made protection to forestall damage by dehydration, mold, rancidity and infestation. At the Rhinelander mills, a half century of experience is behind the development of such protective papers. Fortified with the most modern equipment and company-owned raw material, we can offer definite assurance of uniformly high quality and positive product performance.

Comparable protection against atmospheric and climatic damage to many products such as drugs, dressings, instruments and precision parts is afforded by Rhinelander's specialized and war-tested grease resistant and anti-corrosion papers.

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Far greater safeguard to clothing than ordinary aprons!

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Plus lightness in weight for utmost wearing comfort!

——PRICES — SIZES — COLORS——

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27 x 36...$8.40 per doz.
30 x 36... 9.78 per doz.
36 x 40...11.90 per doz.
36 x 44...12.60 per doz.
Full Length Sleeves
$9.66 per dozen pair
Leggings, Hip Length
$11.90 per dozen pair

BLACK NEOPRENE
27 x 36..$12.90 per doz.
30 x 36.. 14.00 per doz.
36 x 40.. 16.33 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves
$12.90 per dozen pair
Leggings, Hip Length
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ALL WHITE
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$7.15 per dozen pair

OLIVE GREEN
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What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

NEW FARM POLICY—WFA has been liquidated, and "liquidated" in this case means in Washington just what it means in Russia. But the functions and much of the personnel of the War Food organization remain under new Secretary of Agriculture, Clinton Anderson. Certainly all of the responsibility remains, probably in increased measure.

Outstanding among the changes being made by Secretary Anderson is the fundamental one which urges maximum production of every food crop by every farmer and every grower of animals. The Secretary says that surpluses which may result from this change in policy will be cared for by Uncle Sam in a manner fair to the producer. Thus the Department of Agriculture throws away its 12-year philosophy of scarcity for price maintenance.

A second and significant change being made is the recognition of the need for a balanced program from raw materials through processing into guided or controlled distribution. The Secretary gives processing of food its proper recognition of importance. That may permit the food industries to get equipment and supplies more effectively than during recent years.

The inability of any agency, no matter how big or powerful, to make up for present deficiencies within a short time is clearly recognized. Perhaps the greatest assurance for the future is being given by this new feature of the Department of Agriculture attitude. Neither omniscience or omnipotence is claimed. Perhaps the combination may produce something close to "the needed major miracle" of food supply that is required if hunger is to be averted on a world-wide scale.

MEAT NOT NEEDED?—"Everything that meat has that children need in their diet fortunately is available in other foods that are most plentiful, nutritionists for the Children's Bureau, United States Department of Labor, assure mothers who are having difficulty finding meat." This is the attempt of the Children's Bureau to calm fears of mama. It may stir the fears of the meat industry correspondingly.

SCARCITY PLANS—As recently as May, some of the Department of Agriculture economists put out statements regarding dangerous surpluses of certain grains. The implication, though not the direct statement, was that some cutback in wheat production was necessary or the price of wheat would fail. It now appears in Washington that that kind of planning for scarcity is out of fashion. Certainly, the new Secretary of Agriculture does not intend to take a chance on scarcity plans which may make some people starve. It looks as though a bit of very drastic housecleaning in the Bureau of Agricultural Economics may be necessary in order that the personnel there think and write more in harmony with the Secretary's plans.

A PARTY ISSUE—The chairman of the Republican National Committee announces that his party intends to make the bungling in food plans a party issue in the Congressional elections of 1946. This does not promise well for the food business. We shall live in a political turmoil that does not improve our dispositions nor help in improving food technology.

ENOUGH TANK CARS—The greatest scarcity of tank cars ever experienced was forecast, and actually expected, for this past spring. Office of Defense Transportation was very pleasantly surprised by the fact that serious difficulties expected were not realized as readjustment of liquid fuel and liquid industrial products began even before V-E Day. The first official admission that there were plenty of tank cars for both food and non-food movements came when the high demurrage rates scheduled for June application were suspended by ICC.

It now appears that shortly there

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will be enough tank cars to permit some use in specialties that previously could not get tank-car assignments at all. And a substantial surplus in high-grade cars may be expected for the early postwar period. Firms needing to plan for postwar use of this rail equipment soon can usefully begin to shop around for cars to lease or to purchase for that later use.

"TO PRIVATE TRADE"—Government officials late in June rather gleefully announced that "The purchase of French West African cocoa beans of the 1944-45 crop will be returned to private trade on June 26." Thus the government indicates a trend back to private business. Some Washington observers think that this trend will be relatively rapid under the influence of President Truman.

"HUNTING" LICENSE ONLY—When restrictions are revoked by WPB, this does not necessarily mean that the supply of the material no longer allocated is abundant. It merely means that the war needs still can be met fully without following an elaborate allocation program. As one official announcement puts it, this revocation of allocation orders merely grants everyone a "hunting license." This is intended to permit them to go out and buy the commodity *when and if* they find it. Food industry users of scarce commodities must take account of this fact as limitation orders affecting them are cancelled. Actually, increased difficulty in getting goods frequently will follow such revocation.

WAGE-HOUR CLAIMS—Congress is giving serious consideration to the proposed legislation which would limit the time during which employees can bring suit against an employer attempting to collect what the employee thinks are rightful but unpaid wages for overtime work. The bill being considered would limit the time for such claims to one year in suits brought by individuals and two years if the suit is brought by a Government agency in a punitive effort.

Naturally labor organizations are opposing this restriction. It is going to take a lot of pushing by industrial spokesmen to get any action at all and a lot of vigorous argument to get as complete a restriction as is proposed in this bill.

BREAD IS "RATIONED"—Bakery spokesmen in Washington are emphasizing that the rationing of bakery materials becomes in effect a rationing of bread also. Thus the interdependence of many commodity problems is again emphasized to those who have little or no knowledge of food technology. It appears that recognition of this sort of secondary effect of food shortage is becoming the most potent in the Capital City in getting serious attention to problems that have previously been passed over as though unimportant.

Monsanto Recommends Sodium Benzoate Flakes

Many manufacturers of food products and soft drinks have discovered the advantages of Monsanto Sodium Benzoate, U.S.P., in flake form. They have found that it is free-flowing and makes less dust. Also that it does not ball and is, therefore, easy to blend for uniform results in margarine, preserved fruits, pickle brine and beverages.

Monsanto Sodium Benzoate flakes are recommended for ease of application and improved results. However, Monsanto manufactures sodium benzoate as powder for those who prefer it. For samples and technical information on the application of Monsanto Sodium Benzoate to your products, contact the nearest Monsanto office or use the convenient coupon. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

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Sodium Acid Pyrophosphate
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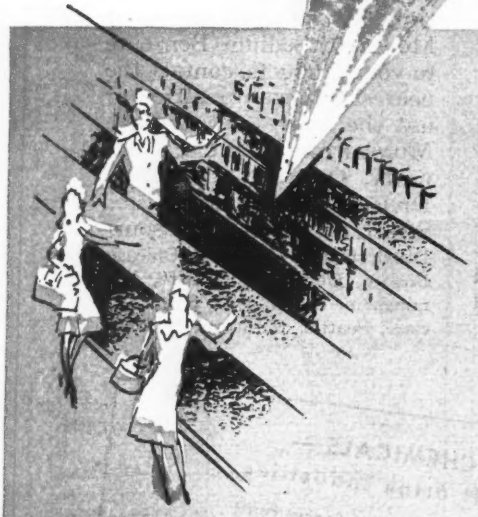

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INDUSTRY

Alderman Farms, Newberg, Ore., has begun construction of a new $90,000 cannery at Dayton, Ore.

The Best Foods, Inc., has consolidated all of its Canadian operations into a single company to be known as The Best Foods (Canadian) Ltd. The Canadian business formerly was conducted through three companies—Hecker H-O Co. of Canada, Ltd., The Best Foods (Canada) Ltd. and 2 In 1 Polishes, Ltd.

The Borden Co. has begun operation of its new cheddar cheese factory in Carthage, Tenn. The plant will provide a market for approximately 50,000 lb. of milk daily.

California Prune and Apricot Growers Association will nearly double its dehydration facilities with the construction of 44 new tunnels, in various regions where the association operates, at a cost of $345,000.

Canada Dry Ginger Ale, Inc., has announced the purchase by the company of Canada Dry Bottling Co., Charlotte, N. C., and Canada Dry bottling Co., New Orleans. In making known the company's postwar program of expansion, R. W. Moore, president, stated that the company plans to build new factories or purchase existing plants to add to its production and distribution facilities.

Dixie Peanut Co., newly formed, has announced plans for construction of a $100,000 peanut factory and storage plant at Williamston, N. C. Work on the project will begin immediately.

General Foods Corp. has acquired the assets and business of The Colonial Salt Co., Akron, Ohio. Announcement was made jointly by Austin S. Igleheart, General Foods' president and Walter F. Ince, president of Colonial. Robert M. Farr, president of Diamond Crystal Salt Co., Inc., will be responsible for the new organization which will be continued under its present management and personnel.

The **Idaho State Legislature** has recently set up a fund of $100,000 to finance food research work at the University of Idaho. Western Regional Research Laboratory, Albany, Calif., will cooperate in this work, and one of the first projects will be the study of the most favorable varieties of crops that may be grown in that region specifically for the canning and frozen food industries.

DR. HORACE L. SIPPLE

Announcement has been made of the appointment of Dr. Horace L. Sipple as director of the research and educational program of the Evaporated Milk Association. Dr. Sipple formerly was associated with the research division of American Can Co., where he conducted research in the fields of food preservation, packaging and canning technology of food and nonfood products.

FRANK ELSWORTH

Having served recently as executive assistant for the Australian War Supplies Procurement Commission, Frank Elsworth has joined Dewey and Almy Proprietary, Ltd., Melbourne, Australia, as managing director. He now is spending several months at the Cambridge, Mass., main office of the company, acquiring a more intimate knowledge of the company's products and methods of operation.

Megowen-Educator Food Co., Lowell Mass., has announced the election of Homer W. Bourgeois of Lowell and Duane Jones of New York as new directors of the company.

Pan-Am Freezers Ltd., Brownsville, Tex., has begun freezing Mexican pineapple and bananas, as well as coconut, Gulf shrimp, fish and Texas vegetables. S. H. Floyd is manager.

Quaker Oats Co. recently acquired the plant, business and brands of the V-O Milling Co., Los Angeles, and plans to manufacture flour and feed at the site.

The Sanger Winery, Sanger Calif., a cooperative, announces the construction of a $62,000 addition which will increase plant capacity to 3,000,000 gal. and permit the crushing of 500 tons of grapes a day.

E. E. STEWART

E. E. Stewart, president of Hydrox Corp., Chicago, and vice-president of National Dairy Products Corp., has been elected a director of the latter parent company.

PERSONNEL

Dr. Edward G. Bayfield, formerly head of the Department of Milling Industry at Kansas State College, has been appointed director of products control and research, Standard Milling Co., Chicago.

Sir Jack C. Drummond, British nutrition chemist and scientific adviser to the Food Ministry, is soon to become a director as well as research director of Boots, Ltd., a large pharmaceutical manufacturer in Britain.

R. N. Du Puis and **C. S. Miner, Jr.** were recently made assistant directors of the Miner Laboratories, Chicago.

A. W. Farrall, formerly director of research, Creamery Package Manufacturing Co., Chicago, is now head of Department of Agricultural Engineering, Michigan State College, East Lansing, Mich.

hot weather breeds extra hazards—

play safe with LO-BAX*

Even the most modern food and beverage plants must exercise extra precautions to maintain quality control during the hot months. The most remote possibility of contamination must be avoided to safeguard foodstuffs and equipment.

Lo-Bax*, the concentrated, fast-killing chlorine bactericide, helps prevent food spoilage, improves quality standards by rigidly controlling bacteria, keeping down mold and sanitizing all surfaces with which food or beverages come in contact.

Simple and easy to handle—Lo-Bax kills bacteria almost instantly on contact . . . and at amazingly low cost. Dissolves quickly in water—hot or cold, hard or soft—to make clear chlorine-rinse solutions. Containing 50% available chlorine, Lo-Bax is dependable – retains its strength.

Protect your production this vital summer—with Lo-Bax. Further helpful information will be sent upon request.

THE MATHIESON ALKALI WORKS (INC.)
60 East 42nd Street, New York 17, N. Y.

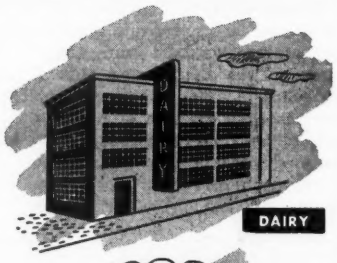
*LO-BAX
50% AVAILABLE CHLORINE

LO-BAX SPECIAL — a superior chlorine bactericide in granular form — packed in 2½-lb. bottles, ½ doz. to the case; and in 14-oz. bottles, 1 doz. to the case.

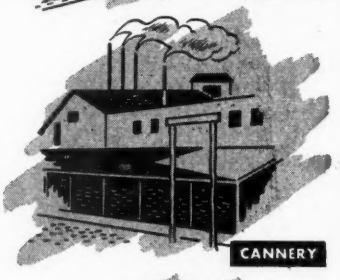
LO-BAX POWDER — a highly efficient chlorine bactericide packed in 28-oz. bottles, 1 doz. to the case.

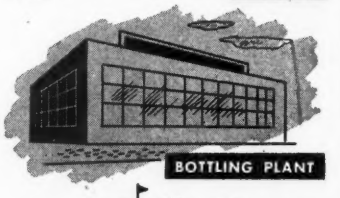
Mathieson
LO-BAX
CHLORINE BACTERICIDE

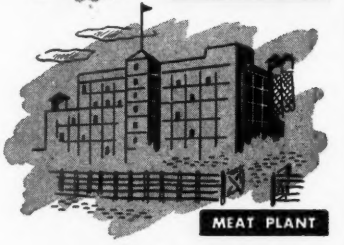
Lo-Bax • Super-Nufos • HTH-15 • Dry Ice • Carbonic Gas • Ammonia, Anhydrous & Aqua • Caustic Soda • Soda Ash • Bicarbonate of Soda • Liquid Chlorine • Chlorine Dioxide • PH-Plus • Synthetic Salt Cake • Sodium Chlorite Products • Sodium Methylate

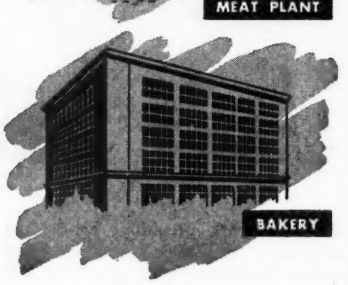


DAIRY


CANNERY


BOTTLING PLANT


MEAT PLANT


BAKERY

Milton P. Fuller, formerly executive vice-president of Thomas Page Mill Co., Topeka, Kan., is now acting general manager of King Milling Co., Lowell, Mich., succeeding the late Charles Doyle.

Frank Glenn, formerly production manager for Nutrine Candy Co., Chicago, is now general superintendent of National Candy Co., St. Louis, Mo.

H. E. Greenlaw is now associated with Citrus Products Co., Plant City, Fla., as production manager. He had been serving the Adams Packing Association, Auburndale, Fla., in the same capacity.

Howard L. Hart, recently assistant treasurer of the Clapp Baby Food division of American Home Foods, Inc., Rochester, N. Y., has been appointed plant manager of the division, according to H. W. Roden, president of the parent company.

Walter R. Hess, formerly research bacteriologist for Swift & Co., has organized the Suburban Laboratories, Inc., Cicero, Ill., to do chemical and bacteriological work in the dairy, meat packing and medical fields.

Col. Rohland A. Isker, director of the Quartermaster Subsistence Research and Development Laboratory and Commandant of the Quartermaster Subsistence School, Chicago, was awarded the honorary degree of Doctor of Science by the University of Maine, for his outstanding research work in the development of Army rations.

Dale Johnson, formerly in charge of bacteriological research for Pillsbury Mills, Minneapolis, is now director of bacteriological research, Plymouth Laboratories, Inc., Chicago.

John L. Locke, secretary and general manager of Fisher Flouring Mills, Seattle, has been elected president of the North Pacific Millers' Association.

C. B. MacLeod has been named president and general manager of Hubbard Milling Co., Mankato, Minn. He had been sales manager for the Big Jo division of International Milling Co., Minneapolis.

G. C. Mahle, formerly executive vice-president of Sugar Creek Creamery Co., Danville, Ill., has been elected president, succeeding H. C. Horneman, newly elected chairman of the board.

James McGowan, Jr., vice-president and former production manager of Campbell Soup Co., Camden, N. J., has been appointed director of research and development. J. M. Hoerle succeeds Mr. McGowan as production manager.

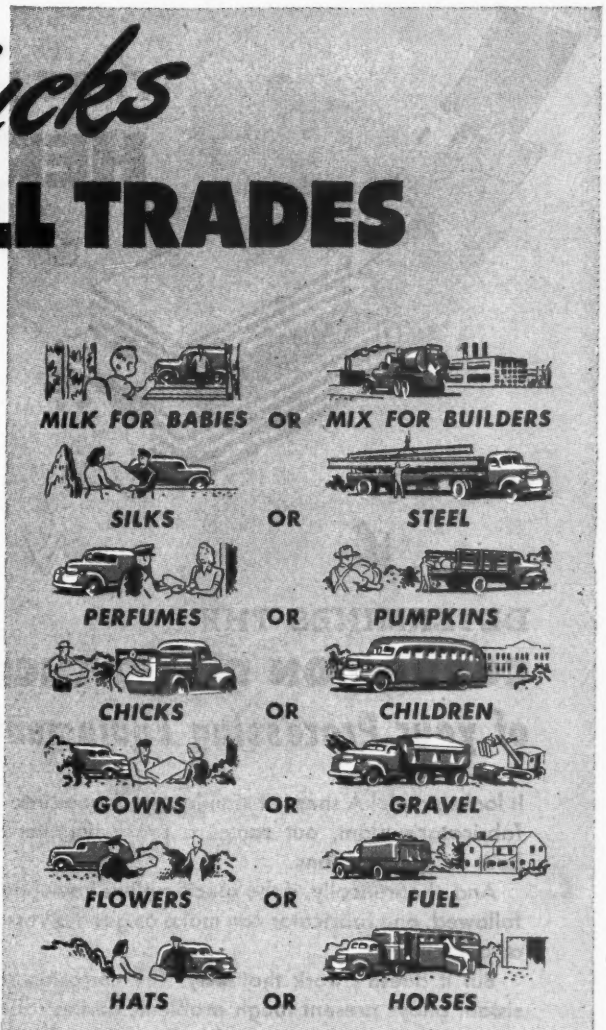
Dr. H. R. Mottern, until recently attached to the Eastern Research

The Right Trucks FOR ALL TRADES

Light loads or heavy pulls, long-distance hauling or local delivery—Chevrolet trucks will do the job economically and dependably, because they are designed, engineered and built for truck work exclusively.

Because truck operators recognized the famous features of Chevrolet trucks as "built-in values" they bought more Chevrolet trucks than any other make in seven of the last nine prewar years. These same features are continued in the 1945 Chevrolet trucks. Should your needs demand extra payload capacity, your Chevrolet dealer can provide the right truck by the installation of the necessary equipment (auxiliary axles, springs, trailers, bodies, etc.).

Buy only as much truck as you need, because it's payload, not chassis weight, that pays profits. *Buy a Chevrolet truck—the right truck for all trades.*



BUY MORE WAR BONDS
HELP SPEED THE VICTORY

NEW 1945 CHEVROLET TRUCKS

All Chevrolet trucks are equipped with the famous valve-in-head six-cylinder truck engine—recirculating ball-bearing steering—diaphragm-spring clutch—hypoid rear axle—articulated hydraulic brakes—sturdy truck frame.

HEAVY-DUTY TRUCKS, 134½-inch and 160-inch wheelbases—Load-Master engine, 93 horsepower, 192 foot-pounds of torque—4-speed transmission, power take-off opening—hypoid single-speed full-floating rear axle—2-speed rear axle—auxiliary rear springs—all-steel cab.

LIGHT DELIVERY PICK-UP TRUCK, 115-inch wheelbase—90-horsepower engine—3-speed Syncro-Mesh transmission—hydraulic shock absorbers, front and rear—all-steel cab—unit-designed body.

SCHOOL BUS CHASSIS, 160-inch and 195-inch wheelbases—safety features to comply with all state regulations: vacuum-power brakes—Tru-Stop, propeller-shaft hand brakes—propeller-shaft guard—special heavy-duty front springs and front axle—two-stage, progressive-action rear springs—double-acting shock absorbers—20-gallon side-mounted fuel tank. Other features same as heavy-duty.

CHEVROLET MOTOR DIVISION
General Motors Corporation
DETROIT 2, MICHIGAN

CHEVROLET

ONE OUT OF EVERY 3 TRUCKS IS A CHEVROLET

WHAT HAPPENS
HERE...

DETERMINES THE
CORROSION RESISTANCE
of your Processing Equipment

It looks simple! A sheet of stainless steel goes into a fabricator's plant, out comes a processing vessel built to specifications.

And, theoretically, if the specifications have been followed, one fabricator can make as good a vessel as another.

But it doesn't work that way. The corrosion resistant alloys present tough problems during fabrication. Unlike carbon steels, they have special properties which must be preserved. Any fabricator can build equipment of metal, but it takes a high degree of specialization to build *alloy* equipment with maximum retention of the original properties.

Strength and corrosion resistance—easier cleaning—lower operating costs—you have a right to demand these qualities in your stainless steel equipment.

For more than 50 years we have been building equipment from corrosion resistant alloys. Our mechanics and engineering staff are trained for this work. Our plant machinery, our tested procedures—have been designed for it. When next you order corrosion resistant equipment, get the extra protection our experience, skill and techniques offer. Consult with us.

S. BLICKMAN, INC., 4108 Gregory Ave., Weehawken, New Jersey

S. BLICKMAN, INC.
Guards Alloys in Fabrication

SEND FOR THIS VALUABLE BOOK
A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

CORROSION RESISTANT PROCESSING EQUIPMENT

TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

Laboratory of the Department of Agriculture, Philadelphia, has joined H. J. Heinz Co., Pittsburgh, as assistant chief research chemist.

A. E. Philips has announced his resignation as president of The White Rock Corp., New York.

J. K. Rickey, manager of the Youngstown, Ohio, branch of Cudahy Packing Co., has retired after 43 years with the firm. He is succeeded by W. L. Cowan, formerly manager of the firm's branch at New Castle, Pa.

Dr. E. C. Saudek recently was appointed production manager for Consumer's Yeast Co., San Francisco. Other appointments made by the company are: Felix C. Karas, superintendent; Wesley M. Noble, chief chemist and Fred D. Meyer, assistant superintendent.

H. Stanley Wanzer, vice-president of Sidney Wanzer & Sons, Chicago, was recently elected president of Milk Foundation, Inc., succeeding A. H. Lauterbach, general manager of the Pure Milk Association.

C. Lewis Wrenshall has resigned his position as assistant technical superintendent for E. I. du Pont de Nemours & Co., Alabama Ordnance Works, and has joined the staff of Southern Research Institute, Birmingham, Ala.

Opportunity

There is an opening for an engineer on the editorial staff of FOOD INDUSTRIES. Journalistic experience is not necessary, but the man selected must have had engineering experience in a food processing plant, preferably a university-trained engineer—mechanical, industrial or chemical.

We believe the man we are seeking has had some experience in designing equipment, operating a department in a food plant and is generally familiar with solving production problems by his own resourcefulness. He is more interested in engineering than in chemistry. He has a likable personality and gets along well with all kinds of people. He is thorough; when he writes a report, his superiors do not have to send him back for more data. He has a questioning mind. He enjoys writing a report.

The man we seek has had from 4 to 10 years of food plant experience and is under 35. The work is challenging, the surroundings ideal, associations stimulating and the future is bright.

The location is New York, but the man will be asked to travel extensively. This is an excellent opportunity for a young man who really wants to grow.

If you know of such a man, please ask him to write his qualifications and send his salary requirements and his photo to the editor of FOOD INDUSTRIES, rather than call in person. Replies will be treated confidentially.—THE EDITORS.

BAGGED...

with Keller-Dorian Functional Packaging Papers

RESEARCH CHEMISTS have spent endless hours and effort to retain the inherent value of food during processing. K-D Functional Packaging Papers can take on the job from there to prevent spoilage and loss of quality. They protect from contamination; prevent exposure to air, light, moisture.

These papers were developed for wartime use—to protect machine parts and equipment, on their way to combat zones, from deterioration or corrosion. They've done their job well . . . and are now ready to go to work for you.

There's a new type plastic-coated paper and one with an aluminum foil backing. They offer protection and longer life to processed and pre-packaged foods, animal or vegetable. Both are greaseproof, moisture-proof . . . and may be heat-sealed, providing an airtight barrier against the *escape* of volatile substances and *entrance* of foreign odors.

Here's another important factor emphasizing K-D possibilities. Perfectly flexible, they may be scored, cut, and folded, to fabricate any size or shape of package. They won't get tacky or brittle, peel or crack at temperature extremes of 190° above and 50° below zero.

They come in a range of weights and sizes, and may be printed or labeled. Use them as branded one-piece wrappers, or as *efficient* liners for cartons and crates.

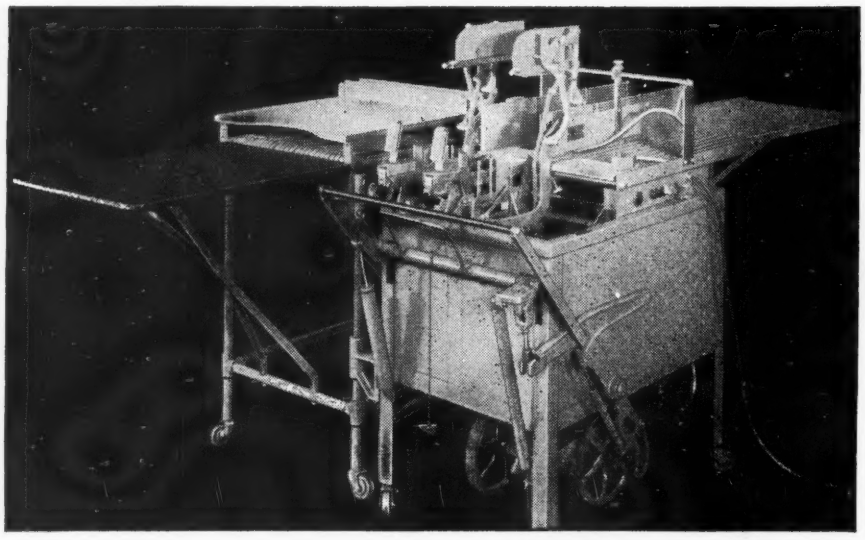
Your postwar planning should not overlook the possibilities K-D papers offer. We're prepared to send you testing samples, data, and suggestions drawn from our own wide experience. An early start would be to your advantage.

KELLER-DORIAN
CORPORATION
Empire State Building
New York 1, N. Y.

FUNCTIONAL PACKAGING PAPERS *for Protecting Perishable Products*

Miller

MODEL M P S WRAPPING MACHINE



SPEEDILY and economically wraps packages in many sizes. Cuts its own wrappers from cellophane or paper rolls. No tools needed to adjust. One girl is all you need to operate or adjust either the heat-sealing or glue-sealing models. Mounted on casters, the MILLER Model MPS can be rolled to the job. Plugs into any wall outlet for power. Send us samples of your packages. We'll quickly give you complete information on this versatile, dependable wrapping machine.

CORLEY-MILLER MODEL BJ VERTICAL HOT PLATE

Heat seals bags, cartons or other packages in MST cellophane, waxed, or thermoplastic coated papers. Ideal for trays or window boxes. Non-corrosive stainless steel and aluminum construction makes it perfect for use in quick freeze plants, locker plants and other damp locations.

MACHINES FOR: WRAPPING, BAG MAKING, BAG AND CARTON FILLING, BAG CRIMPING OR CLOSING, GLUING AND SHEETING, SANDWICH MAKING.

Miller Wrapping & Sealing Machine Co.

12 SOUTH CLINTON STREET, CHICAGO 6, ILLINOIS

DEATHS

John De Haven, 63, president and chairman of Allied Mills, Inc., Chicago, June 25.

Frank L. Knight, 79, former president and general manager of the Knight Packing Co., Portland, Ore., July 3.

Matthew R. Pritchard, 51, general manager of the J. I. Gates Milling Co., Columbus, Ohio, June 16.

Frank A. Schaedel, 52, supervisor of dehydration operations at Libby, McNeill & Libby, Chicago, May 28, in Chicago.

Owen Mulkey, 85, former treasurer of Mulkey Salt Co., Detroit, and founder of the Detroit Salt Co., June 30, in Detroit.

J. M. Seymore, 54, former owner and president of Delicia Ice Cream Co., Nashville, Tenn., June 21.

Edgar Smith Stubbs, 71, president of Old Dominion Peanut Corp., Norfolk, Va., July 6.

William A. R. Welcke, 75, 1st vice-president and treasurer of Fritzsche Bros., Inc., New York, July 13, at Mt. Vernon, N. Y.

ASSOCIATED INDUSTRIES

American Can Co. has established a new branch laboratory at Los Angeles to serve the packing and canning industry of Southern California. Paul E. Alexander, who has been with the company's San Francisco laboratory, will be in charge of the new branch.

The Midwest Research Institute has appointed Dr. George E. Ziegler executive scientist in charge of project production. Dr. Ziegler, formerly chairman of the physics section of the Armour Research Foundation, Chicago, directed the development of the wire sound recorder.

Pacific Can Co., San Francisco, has announced plans to construct a new can factory in San Leandro, Calif. The company now has two plants in San Francisco and one in Modesto.

Robbins & Myers, Inc., Springfield, Ohio, announces the recent election of A. W. McGregor as executive vice-president and F. W. Smith as vice-president. W. J. Helmer is now general sales manager.

Spencer Lens Co., Buffalo, N. Y., has announced a change in name to American Optical Co., Scientific Instrument Division.

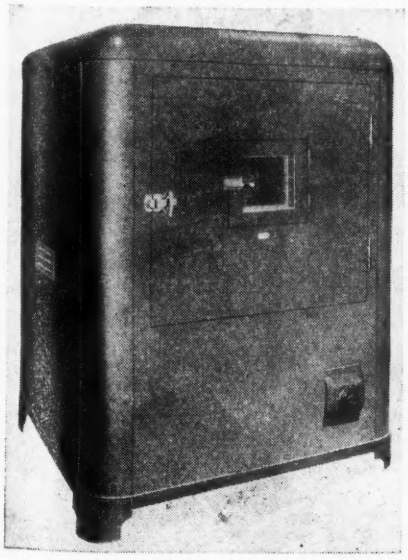
FOOD EQUIPMENT NEWS

Diaphragm Relief Valve

DIAPHRAGM relief valves, type 1000, have been introduced by Farris Engineering Co., 345 Commercial Ave., Palisade Park, N. J. The diaphragm is said to act in several capacities. It seals a valve from leakage encountered around the stem in the conventional design and is therefore particularly adaptable for relief service where there is fluid constantly on the downstream side. As a result of pressure on the diaphragm, the relief valve opens with considerably more force since the diaphragm area is much greater than that of the disk. This feature makes this type of valve particularly adaptable where the relief valve is to be used as a control valve rather than as a reducing valve.

Compact Oven

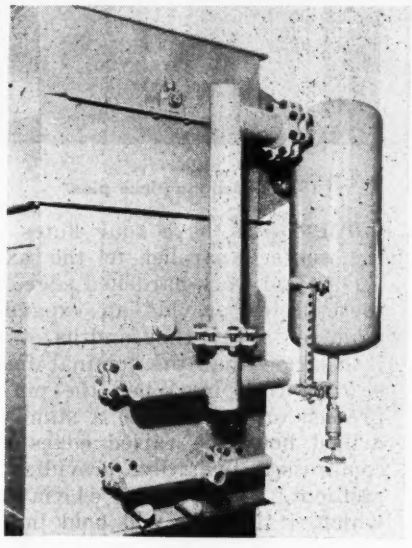
A COMPACT and completely self-contained oven has been designed for laboratory and pilot-plant use by Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland 2, Ohio. Sizes of oven working space range from 3x3x3 ft. up to 6x6x6 ft. in increments of 1 ft., and special sizes can be furnished to specification. Temperatures range up to 900 deg. F., with a guaranteed differential of plus or minus 2 deg.. The oven can be furnished with electrical heating elements or equipped to use any other type of fuel. The company states that in every case the heating equipment is contained within the oven shell. The smaller models are shipped assembled, ready to connect to the heat source.



Completely self-contained oven

De-oils Refrigerant Gas

ALL oil is said to be removed from refrigerant gas by a new unit manufactured by the Niagara Blower Co. 6 E. 45th St., New York 17. The new apparatus uses a cylindrical drum located at the outlet of the coil, the gas entering with a tangential motion. More oil is removed by this method because the coil reduces the temperature of the gas, thus condensing the oil vapor. Expansion of the system from a 4-in. pipe to a 14-in. drum reduces the velocity of the gas so that the oil is easily removed and held by the wall and separator plates of the trap. A sight gage and a valve for draining the oil are provided.

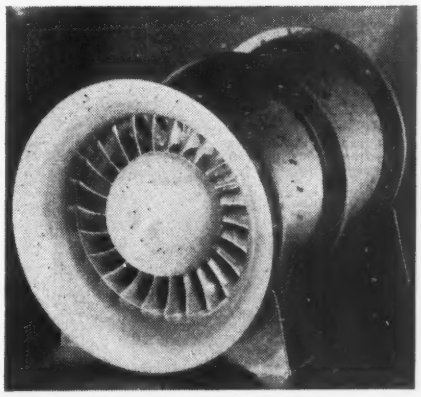


Removes oil from refrigerant gas.

Removing oil from refrigerant gas is said to improve the efficiency and capacity of a refrigeration system.

Axial-Flow Compressors

COMPRESSORS, blowers and fans of new design are being made by Buffalo Turbine Corp., 2165 Bailey Ave., Buffalo 11, N. Y. A rotor which departs radically from the conventional is said to have pressure and flow characteristics which give high efficiency over a wide range.



Axial-flow blower.

The high capacity and small size of many of these units has made it necessary to develop special motors of exceptionally high horsepower and small diameter. These, in turn, have made possible equipment weighing only 30 per cent as much as the conventional types. Typical is the 14-in. blower illustrated. It delivers 8,000 c.f.m and 10 in. s.p. at 3,450 r.p.m. It is driven by an 8-in. 20-hp. motor, and the complete unit weighs only 130 lb.

Noise level is extremely low, as comparable pressures and flows are obtained at approximately one-half the conventional design speeds.

The complete line is to include a wide range of direct-driven units with air pressures from ⅜ to 100 in. of water at synchronous motor speeds. Also, direct-connected turbine-driven units up to 100 p.s.i. and 100,000 c.f.m. will be built.

AC Vacuum Gage

PACKERS of food products requiring vacuum readings will be interested in a new type of vacuum indicator known as the Tru-Vac which operates direct from any ordinary 110-120 volt line. This new gage is scaled to read pressures of a vacuum system from 0.25 to 250 microns. It requires no batteries or additional equipment. The gage is said to be accurate to plus or minus 2 percent throughout the scale, with constant voltage input. It is unaffected by changes in barometric pressure. The meter and controls are contained in a compact metal case. They can be mounted at a distance from the point at which measurements are taken. The vacuum indicator is manufactured by the Continental Electric Co., Geneva, Ill.

CHECK UP NOW ON

VIBROX PACKERS

There are three sources of definite dollars and cents savings when a Vibrox is put to work on a packing job that has previously been done manually.

1. More material is packed into the same size container—or the same amount in a smaller container. Either way there is a definite savings in container costs.
2. Less time is required to thoroughly pack even more material into the container—resulting in greater production per man hour.
3. Warehouse and shipping economies are automatic when more material is packed into each container. Less handling—more storage capacity in a given amount of space—savings in tare weight—and additional savings sometimes result from avoiding minimum carload penalties.

While deliveries are slow at this time —it will pay you to plan now on modernizing your packing operations for tomorrow's business. Complete information on request.

B. F. Gump Co.

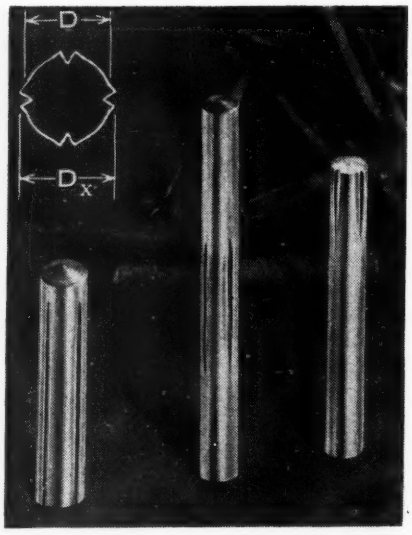
Established 1872

454 SO. CLINTON STREET
CHICAGO 7, ILL.

MAKERS OF: Equipment for Grinding, Mixing, Feeding, Sifting, Weighing or Packing of Dry Food Products.

Handy Lock Pins

DRIV-LOK PIN CO., 565 West Washington Blvd., Chicago 6, Ill., has brought out a complete line of standard and special self-anchoring, vibration-proof pins to replace taper pins, keys, cotterpins, setscrews and rivets.



Self-anchoring lock pins.

These pins have four flutes on the surface parallel to the axis. The raised work-hardened edges of these flutes provide an expanded diameter a few thousandths of an inch larger than the nominal diameter of the pin. When the pin is pressed or driven into a standard drilled hole, the raised edges are compressed inwardly, providing a resilient, self-locking element which, it is said, will hold indefinitely under vibration or shock conditions.

The pins are available in diameters from 3/64 to ½ in. and lengths from 3/16 to 4½ in. in any material and in a wide variety of types.

Rotary Pump

FOR pumping water or other liquids under high pressure, the Bump Pump Co., La Crosse, Wis., has manufactured a low-capacity, close-coupled rotary pump. The capacities range from ¼ to 8 gal. per min. This new pump will operate on vacuums as high as 26 in. It is said to operate efficiently with water up to 500 lb. pressure, and with oils or other viscous liquids up to 1,000 lb. pressure. It operates at full motor speed of 1,750 r.p.m. for lighter liquids, or at 1,200 r.p.m. for heavy liquids. It is of the positive-displacement type and has a mechanical seal. The shaft is mounted on ball bearings. The pump can be furnished either with or without built-in bypass and relief valves.

Wrapping Machine

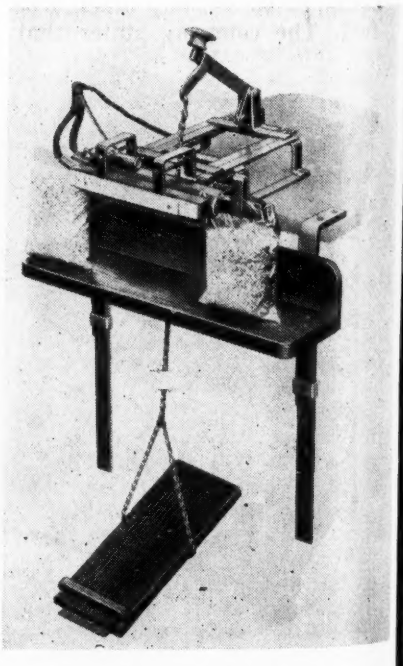
TO HANDLE a wider range of products, including peppermint patties and sandwich crackers, Package Machinery Co., Springfield, Mass., has equipped its Model DF wrapping machine with a newly designed folding box. This machine is so designed that all forming and end-folding of the wrapper takes place over breaker bars and tuckers and not over the product itself. Irregularities in the shape of the product are said not to affect the perfection of the wrapping. Electric-eye registration assures accurate placing of the printed design.

Jaw-Type Heat Sealer

PACK-RITE MACHINES, 828 North Broadway, Milwaukee 2, Wis., announces a jaw-type heat sealer into which bags or pouches are fed in a vertical position. The product in the bag naturally settles to the bottom, permitting a seal close to the contents.

Slight pressure on a pedal or a lever actuates two sliding steel bands, bringing the forward crimper bar in close mesh with the rear bar. Spring tension returns the bar to the feeding position.

To facilitate feeding the bags into the sealer, a lead-in or feeder attachment is mounted independently of the heated bars. To speed discharge of sealed bags, a light

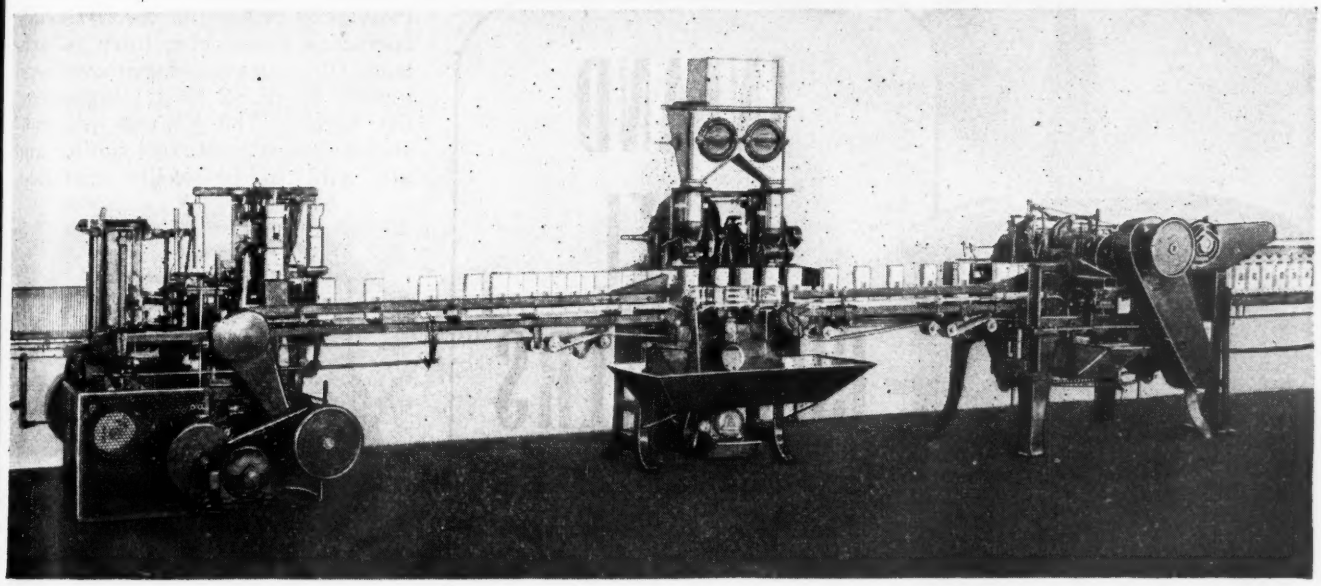


Vertical jaw-type heat sealer.

"PNEUMATIC"

the name that means Lower Cost Per Container

PACKAGING EQUIPMENT



CARTON FEEDER—BOTTOM SEALER TWO SCALE WEIGHER TOP SEALER

HERE is a Pneumatic four-machine hook-up that's a winner every time when it comes to packaging common everyday household items in printed seal-end cartons.

Ruggedly constructed and noted for their operating efficiency these Pneumatic machines (Carton Feeder, Bottom Sealer, Two Scale Weigher and Top Sealer) are in daily use throughout the country handling numerous products such as: peas, beans, rice, sugar, naphtha flakes, spices, salt, water softener, soap powder, cornstarch, macaroni, flour, gloss starch, cracker crumbs, washing powder, barley, tea, coffee, baking powder, etc.

The packaging installation pictured above is rated at 25 to 35 packages per minute. Being readily adjustable, it is entirely practical to run a variety of products and a range of carton sizes on these fully automatic machines.

Important to you, as users will verify, is the fact that all these features add up to *Lower Cost Per Container*. You'll find it pays to consult Pneumatic whenever you have a packaging problem. Expert advice from our staff of experienced and qualified engineers is yours for the asking. Pneumatic Scale Corporation, Ltd., 91 Newport Ave., North Quincy 71, Mass. San Francisco, New York, Chicago, Los Angeles

1895 FIFTY YEARS OF PROGRESS 1945

PNEUMATIC
PACKAGING AND BOTTLING
MACHINERY

★ ★ ★ ★ ★ ★

We can't afford food losses by Spoilage, Leakage or Contamination due to faulty containers . . .
INLAND STEEL CONTAINERS
. . . . are constantly proving their reliability for the safe packaging of foods shipped all over the world.
1
2
3
4
5
Convenient cover openings make filling easy and air-tight; resealing after opening practical.
1. Lever locking ring drum No. 55188
2. Lever locking ring pail No. 514X
3. Swivel-spout por-pail No. 584R
4. Band seal pail No. 564
5. Lug covered pail No. 584
INLAND STEEL CONTAINER CO.
Container Specialists
6532 S. MENARD AVENUE, CHICAGO 38, ILLINOIS
PLANTS AT CHICAGO • JERSEY CITY • NEW ORLEANS

wire elevates and spreads the heating-element wires, thus forming an exit bridge.

The unit will operate on 110 volts, a.c., and a thermostat provides the range of heat required for the various heat-sealing material. Full-length, brass-sheathed Regan heating elements give uniform heat distribution, while an asbestos guard attached to the forward crimper bar protects the operator's hand. Machines are available with 8-, 10- or 12-in. bars and three types of crimp impressions—horizontal, vertical or flat seal.

Guards for Lift Trucks

PROVIDING protection for lift truck operators, Townmotor Corp., Cleveland, Ohio, has developed overhead guards to fit all of its models of lift trucks. The guards are constructed of rugged steel tubing and are said to be easily installed.

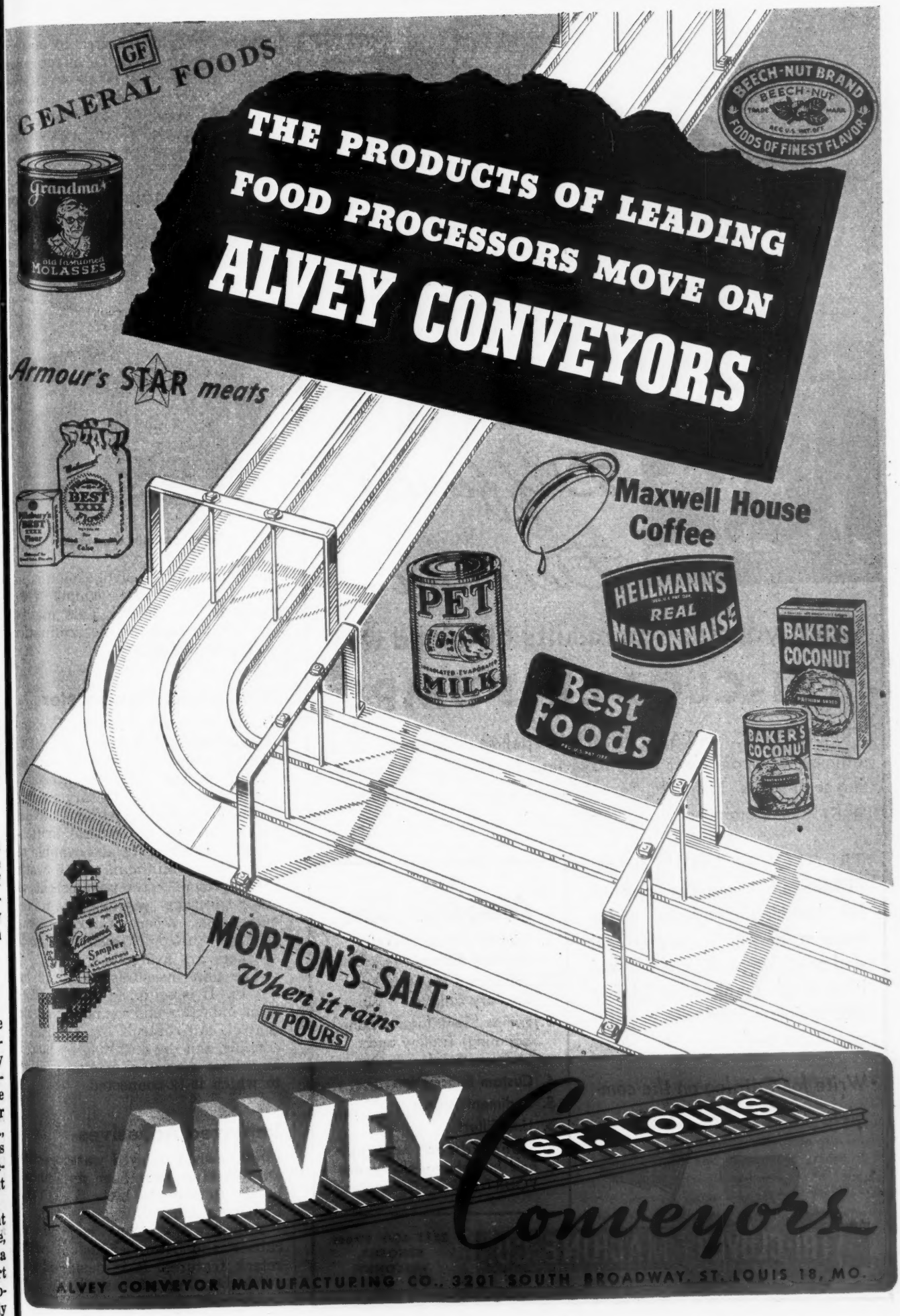
Lift trucks with overhead guards.

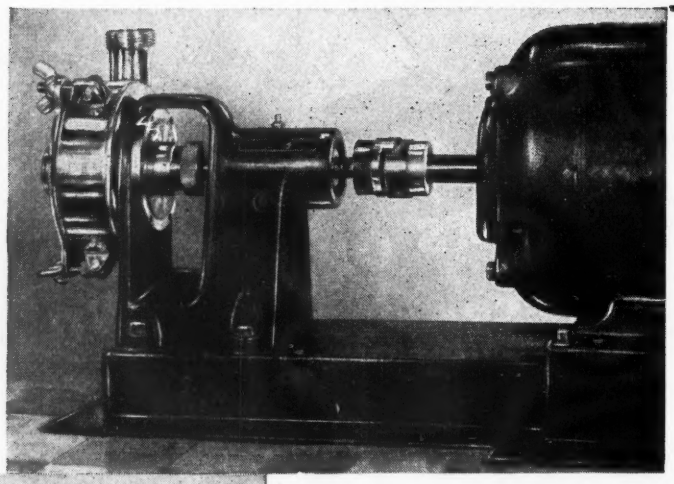
When installed the guards extend in front of, over and behind the operator. The guards are made of 1½-in. steel tubing and can be installed in 10 or 15 min. time by means of bolts and clamps which are furnished.

Electronic Jar Inspector

GLASS JARS and bottles may be inspected for cracks or irregularities on the sealing surface as they pass on a rotary turntable at production-line speed. This is possible with a photoelectric crack detector developed by General Electric Co., Schenectady, N. Y. It detects flaws barely visible to the naked eye, rejecting faulty containers without interrupting the process.

As the containers move in front of the sensitive photoelectric tube, they are whirled rapidly while a strong light is directed on the part to be inspected. Since the phototube is not affected by a steady


GF
GENERAL FOODS
THE PRODUCTS OF LEADING FOOD PROCESSORS MOVE ON
ALVEY CONVEYORS
BEECH-NUT BRAND
FOODS OF FINEST FLAVOR
Grandma
MOLASSES
Armour's STAR meats
Maxwell House Coffee
HELLMANN'S REAL MAYONNAISE
PET MILK
Best Foods
BAKER'S COCONUT
BAKER'S COCONUT
MORTON'S SALT
When it rains
IT POURS
ALVEY
ST. LOUIS
Conveyors
ALVEY CONVEYOR MANUFACTURING CO., 3201 SOUTH BROADWAY, ST. LOUIS 18, MO.



Not a Difficult Decision—

when you see the results obtained with

TRI-CLOVER PUMPS

TRI-CLOVER SANITARY PUMPS in Trialloy or Stainless Steel efficiently handle clear and heavy liquids, also liquids containing semi-solids. Have the "gentle push" action, which prevents agitation, foaming or coagulation.

TRI-CLOVER INDUSTRIAL PUMPS are especially adapted for handling products under vacuum, or where a water seal and precision packing gland seal is required. Furnished in Trialloy and Stainless Steel with or without water seal.

Write for Catalog on the complete TRI-CLOVER LINE.

THE *Complete Line*

1. Trialloy (Cupro Nickel) Sanitary Fittings
2. Fabricated Stainless Steel Sanitary Fittings
3. Pumps (Centrifugal—non-agitating) Trialloy and Stainless Steel
4. Custom Fabrication
5. Sediment Testers
6. Line Filters

Standardized Accuracy and Interchangeability are YOUR Tri-Clover Guarantee.

Try TRI-CLOVER MACHINE CO.

2815 60th Street
KENOSHA,
WISCONSIN

light, the light reflected by a perfect glass produces no effect. But a rapidly spinning bottle with even the slightest imperfection causes the light beam to flicker and thus actuate an ejector to remove the imperfect container.

Polyphosphate Comparator

W. A. TAYLOR & Co., 7300 York Road, Baltimore 4, Md., has developed apparatus for determining polyphosphates. The usual method

Polyphosphate comparator.

for determining polyphosphates involves boiling the sample from three to four hours. This method is said to complete a determination in about 20 minutes.

Communication Booster

IMPROVED power boosters are announced by Talk-A-Phone Mfg. Co., 1512 S. Pulaski Road, Chicago 23, Ill. These make possible interoffice communication and factory paging on the same system without having to go through the central switchboard. These units are capable of delivering a minimum of 15 watts "voice range" power sufficient to cover average paging-system requirements. Where local conditions require greater power, special speakers are available.

The unit measures 6 by 12 by 6¼ in. It is equipped with a pilot-light indicator and variable volume control. All controls are easily accessible, and the unit may be placed anywhere near the master station to which it is connected.

Improved Adhesives

FOUR newly improved water-resistant adhesives have been announced by the Paisley Products, Inc., 1770 Canalport Ave., Chicago 16, Ill.

Adhesive No. 3130 is a reclaimed rubber and resin emulsion, with retack features. It is designed for quick bonding of case liner and waterproof bag stocks.

SAVE TIME! . . . . . SAVE MONEY! . . . . . GET ACTION!

LET ONE CALL DO IT ALL

WHEN YOU NEED STAINLESS STEELS

TROwbridge 7000

ACTION—on your complete order—that's what you'll receive when you telephone Industrial *first* . . . for, if it's Stainless, Industrial has it.

Carrying the largest, most diversified warehouse stock of Stainless Steels in America, Industrial is prepared to render *same-day attention* to your order. Whatever your need—sheets, bars or bolts, valves, fitting, tubing or other Stainless Steel items—you'll find that Industrial can furnish them promptly . . . *at no premium over mill prices!*

Expert metallurgists at Industrial are at your service to assist in solving any specification or fabrication problem concerning Stainless. Don't hesitate to request help if you need it. And if you haven't an Industrial catalog, write today for your free copy. Industrial Steels, Inc., 250 Bent Street, Cambridge 41, Mass.

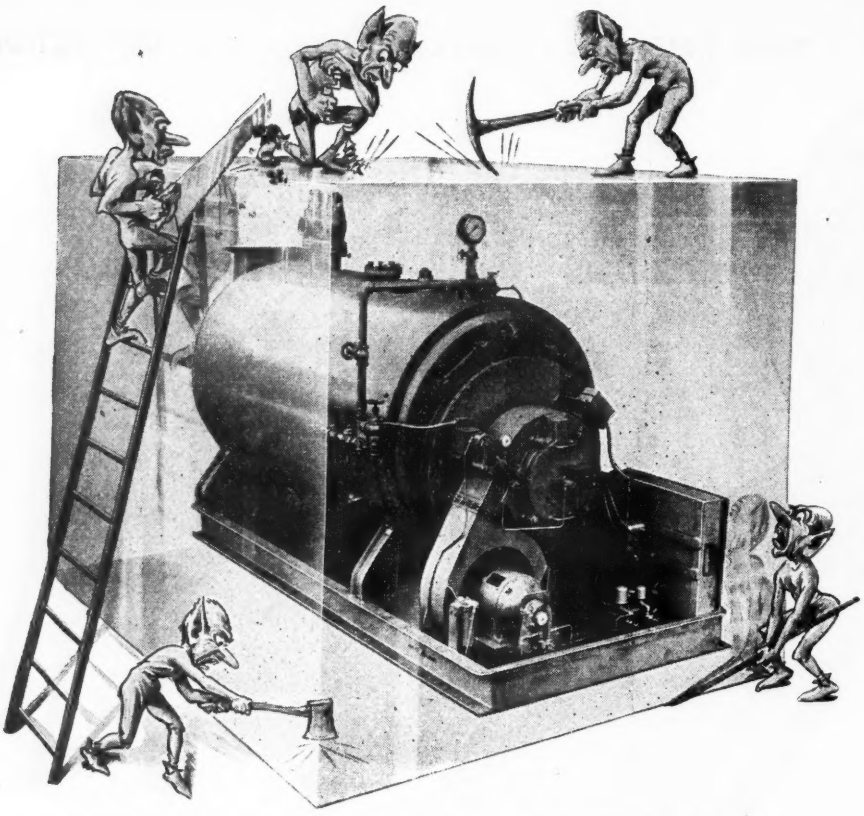
CI-GI CI-GI

STAINLESS SURFACE HARDENING PROCESS GIVES 1100 BRINELL SURFACE HARDNESS

This efficient new process combines the corrosion resistance of Stainless with the abrasion resistance of a nitrided surface. Both austenitic and martensitic grades of Stainless now can be hardened with this process.

Write Stainless Surface Hardening Co., 255 Bent St., Cambridge 41, Mass., a subsidiary of Industrial Steels, Inc.

Everything in STAINLESS **INDUSTRIAL STEELS, INC.**



CYCLOTHERM ENGINEERING— AN INVISIBLE PROTECTION

When you buy a steam generator, the "know-how" that went into its designing and building is your best guarantee of continuous, trouble-free, economical operation. It is engineering know-how that produces a superior product.

That is why Cyclotherm Steam Generators are emerging from the war with veterans' reputations. Thousands of these rugged units have proved that they can "take it" and deliver under all kinds of war-time service in the Army, Navy and Marine Corps. Their record is your assurance that a Cyclotherm gives protection against operating and maintenance headaches.

All Cyclotherm units—and only Cyclotherm units—are designed on unique principles of combustion that result in top efficiency and dependability while holding operating and maintenance costs to a minimum.

Cyclotherm units range from 10 HP to 200 HP. They are completely self-contained, automatic, oil or gas fired. They come to you assembled and tested, ready for immediate operation after oil, water, electrical and steam outlets are connected. No special foundation or stack is needed.

Whether you utilize steam for power, processing or heating there's no job too tough for the veteran Cyclotherm.

Orders are now accepted for early delivery.

CYCLOTHERM
STEAM GENERATOR

CYCLOTHERM CORPORATION
90 BROAD STREET, NEW YORK 4, N. Y.

No. 4016 is an asphalt and rubber emulsion, with retack features, for hand brush application to large case liners and bags. It is medium-fast setting.

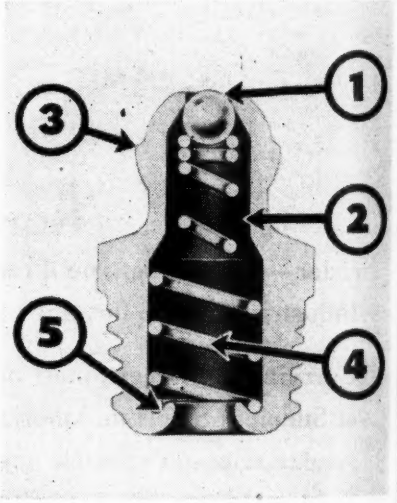
No. 676 is a vinyl polymer emulsion, for fast hand or machine sealing of V-boxes, small cartons, case liners and bags.

No. 688 is a vinyl polymer-starch adhesive. It is recommended for hand brush sealing of V-board cartons and cases where good suction is necessary and where the final drying is accomplished under pressure.

These adhesives are said to be noninflammable and free from objectionable odors. The adhesive and resin solids are suspended in water.

Grease Fitting

LINCOLN ENGINEERING CO., St. Louis, Mo., announces a new grease fitting. Some of the unique features of this fitting are a ball check (1), which is flush with the top of the fitting (3), preventing dirt and



Grease fitting.

foreign matter from lodging in the opening and being forced into the bearing. It has a noncollapsible spring (4) which cannot be forced out, as the base of the fitting (5) is designed to form an inverted-ring seat channel from which the ball check spring cannot slip.

Heated Rotary Pump

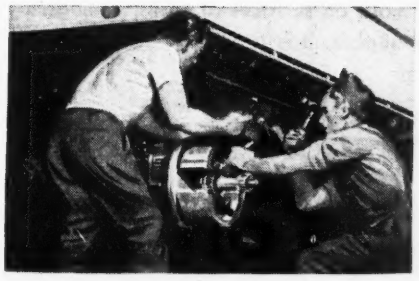
STEAM-JACKETED rotary pumping equipment of improved design has been put into production by Blackmer Pump Co., Grand Rapids 9, Mich. The new unit handles sludge and other viscous liquids. It has a capacity of 500 g.p.m. at 155 p.s.i. and is powered by a 75-hp.

TRAILMOBILE SERVICE IN ACTION

Who keeps Butch's bottle full?

In Chicago, chances are, it's the spic-and-span tank trailers, operated by the Dice Motor Delivery for the Bowman Dairy Co. They haul milk from a hundred miles around. Each unit works ten hours . . . hauls 22,000 pounds of milk a day. Laying up a single unit for a working day is serious and delays may mean milk spoilage.

That poses a real problem— how to keep these tank trailers in tip-top shape and free from breakdowns . . . sanitary . . . well painted all the time—and still work them ten hours a day, every day.

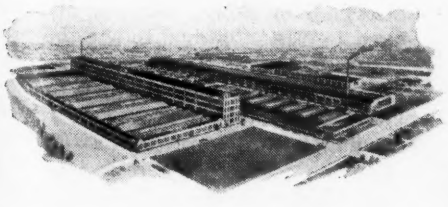


The solution. At night the trailer goes into our Chicago Servicenter for anything from a mechanical checkup to a complete repaint job.

Next morning . . . the trailer is on the job completely serviced. No time is lost. Risk of spoilage due to breakdowns is minimized to the *nth* degree. *That's good business!*

It's good business for you, too, to put your service problems—whatever they are— in Trailmobile's hands. Each of Trailmobile's 60-odd Servicenters is equipped to give factory standard service on anything from a mechanical checkup to a complete rebuild job,—economically and promptly. The Trailmobile Co., Cincinnati 9, Ohio; Berkeley 2, California; Charlotte, North Carolina.

Headquarters Plant
Cincinnati, Ohio

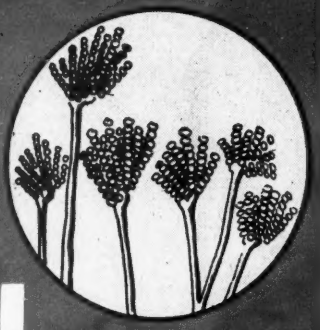


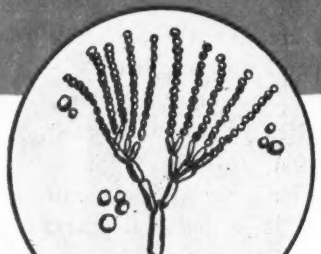
TRAILMOBILE

104 Years of Building Transport Vehicles • Sales and Service in Principal Cities

Here is a NEW answer to

MOLD CONTROL





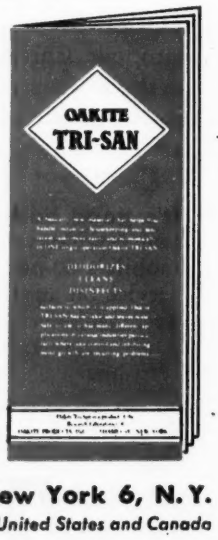
HERE are three of the many trouble-causing varieties of mold. They are commonly encountered in cold storage plants, food plants, proofing rooms of baking establishments and many other places. Wherever found mold growths are a constant threat to product quality.

But a NEW answer for the control of mold on surfaces of walls, ceilings, floors and certain equipment is now available. It is a NEW specially designed material in powder form known as

OAKITE
TRADE MARK REG. U. S. PAT. OFF.

TRI-SAN

Due to its potent germicidal and fungistatic activity, a solution of Oakite TRI-SAN, applied to surfaces with cloth or brush inhibits and controls the growth of mold organisms such as aspergillus, Penicillium and Rhizopus. Safe to use, highly effective, extremely economical, we invite you to make tests of Oakite TRI-SAN and see for yourself how successfully it combats mold growth.



Send for this FREE Booklet

This 20 page booklet gives you complete directions for using and applying Oakite TRI-SAN in connection with mold control and many other plant sanitation problems. Your copy is free for the asking . . . write for it today.

Oakite Products, Inc., 26G Thames Street, New York 6, N. Y.

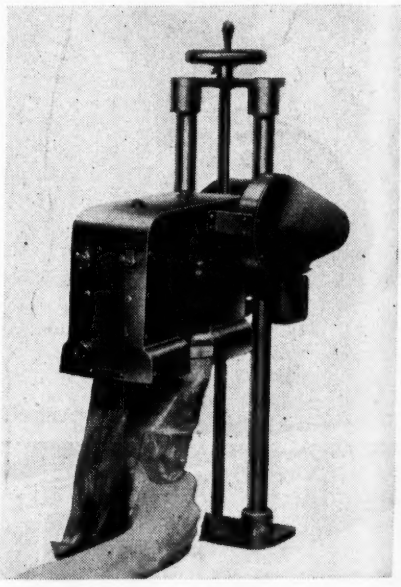
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE MATERIALS METHODS SERVICE — Buy Bonds for Victory — CLEANING FOR EVERY CLEANING REQUIREMENT

gearhead motor with a speed of 155 r.p.m. at the driveshaft. The pump construction is iron, bronze fitted, and the entire unit is mounted on a cast iron base. The steam jackets are suitable for pressures up to 125 p.s.i. and are located on both ends.

Rotary Heat Sealer

CODIE-KAY CO., 1139 San Julian St., Los Angeles 15, Calif., has introduced a rotary-type crimp heat sealer. Fastened to a bench or table, it can be fed by hand or conveyor. Raising or lowering is accomplished by a hand-operated



Rotary crimp heat sealer.

screw to accommodate bag sizes from 1½ to 15 in. in height. A conveniently located thermostat adjuster gives controlled temperatures up to 700 deg. F. All working mechanisms are equipped with precision ball bearings and all moving parts, belts and pulleys are safely guarded.

Running at a speed of 240 lineal inches per minute, the unit seals bags as fast as they can be fed. It operates on 110 volts, a.c.

Drop-Feed Oiler

A NEW adjustable drop-feed oiler has been developed by Oil-Rite Corp., 3466 South 13th St., Milwaukee 7, Wis. Claimed to the the first miniature transparent oiler, it operates by gravity and has an oil port adjustable over a wide range. A hollow lock screw and a setscrew provide positive locking, retaining any desired setting. Located within the reservoir, the adjusting screw is less liable to tampering.

CATALOGS, BULLETINS

FOOD PLANT EQUIPMENT

Static Eliminator—How a static electricity eliminator is installed is shown in a new bulletin by Seedburo Equipment Co., 23 W. Jackson Blvd., Chicago 6, Ill. The eliminator is made of thousands of fine, durable brass wire bristles interwoven between two heavy copper wires. By suitably grounding these metal brushes, static is dissipated from moving belt.

Sanitary Pumps—Specialty Brass Co., Kenosha, Wis., has a new 12-page catalog which illustrates and describes a complete line of improved sanitary centrifugal pumps for food products.

Electronic Heaters—Application of vacuum-tube electronic heaters for both induction heating of metals and dielectric heating of nonmetallic materials is explained in a well-illustrated 4-page bulletin issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. How the two types of heating work and the advantages of each are clearly pointed out, and numerous applications are indicated.

Germicidal Fixtures—Illustrating the more common types of germicidal fixtures (ultraviolet lamps), is a new 4-page folder issued by the Edwin F. Guth Co., 2615 Washington Ave., St. Louis 3. Detailed information is given on what may be expected from these lights, the area in which they are effective, and other information.

Vacuum Equipment — Invincible Vacuum Cleaner Mfg. Co., Dover, Ohio, has a 4-page leaflet describing the various vacuum units used for cleaning dust and dirt around machinery and plants.

Rotary Dryers—General American Transportation Corp., 420 Lexington Ave., New York 17, N. Y. has published Bulletin No. 52 (513a), describing and illustrating the construction of rotary dryers.

Water Saver—Describing how as much as 50 percent of the water used for washing and cleaning can be saved, B. F. Goodrich Co., Akron, Ohio, has issued a 22-page booklet entitled "Lonn." The Lonn principle is used in the construction of a valve which is opened and closed merely by tilting the hose. This eliminates any waste of water when the hose is not in actual use. The book illustrates applications and shows a number of attachments employing this principle, both in air and water sprays.

Drum Dryers—An 8-page bulletin—No. 250 (513A)—describing a line of drum dryers has been made available by General American Transportation Corp., 420 Lexington Ave., New York 17. It is illustrated with photographs of several installations.

Cooling Unit—A 4-page bulletin issued by the Fluor Corp., Ltd., 2500 South Atlantic Blvd., Los Angeles 22, describes fin-tube construction, as well as fans with variable-pitch blades and variable-speed drives.

Mixers—A 4-page bulletin describing turbo mixers has been published by General American Transportation Corp., 247 Park Ave., New York 17. Applications of this equipment in the food industries are described.

Sludge Filters—Bulletin No. 100 issued by General American Transportation Corp., 420 Lexington Ave., New York 17, describes sludge filters and gives engineering data.

Pumps—Fairbanks, Morse & Co., Chicago 5, has published bulletins AQB400.1 on lubricated turbine pumps and AQB500.1 on propeller, low-lift, large-capacity pumps.

Vinegar Hose—Containing a data table showing sizes, number of plies, net weight per hundred feet, outside diameters and working pressures for liquids, a new catalog section on vinegar hoses compiled by The B. F. Goodrich Co., Akron, Ohio.

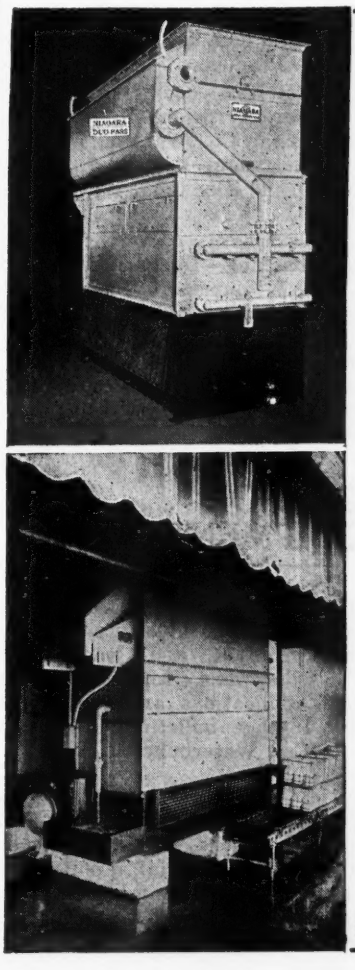
Creamery Hose—B. F. Goodrich Co., Akron, Ohio, has published a new catalog section giving details of construction and data on creamery hose.

PLANT SUPPLIES

Fabricating Thermoplastics — Fabricating methods for Lumarith, celluloid and similar thermoplastic materials are described in a new 136-page manual issued by the Celanese Plastics Corp., 180 Madison Ave., New York 16. Details, comprehensive instructions, and diagrams are given for every phase of fabricating cellulosic thermoplastics.

Shaft Couplings—Describing a complete line of shaft couplings, a new 8-page illustrated booklet has been issued by the Link-Belt Co., 307 N. Michigan Ave., Chicago. Sizes, dimensions and list prices are given for flexible, rigid flanged face and compression type couplings.

Leather Packings—The Chicago Belting Co., 113 N. Green St., Chicago,



PATENTED

NIAGARA Duo-Pass AERO CONDENSER

has saved refrigeration users as much as 35% of the power consumed to operate compressors, has increased plant capacity and saved 95% of condenser water costs. The patented NIAGARA DUO-PASS reduces condensing temperatures, prevents loss of capacity from scale on condenser tubes.

Write for Bulletin 91

NIAGARA

"No Frost" METHOD of Refrigeration

Increases refrigeration capacity from existing compressors — saves power—saves maintenance trouble and attention—increases plant production and earnings. With the "NO FROST" Method you always have full capacity with never any refrigeration loss from frosted coils.

Write for Bulletins 83 and 95.

NIAGARA BLOWER COMPANY

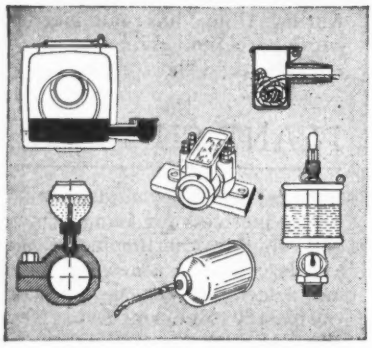
"30 Years of Service in Industrial Air Engineering"

Dept. F. I. 85, 6 E. 45th St., New York 17, N. Y.

Field Engineering Offices in Principal Cities

PATENTED

LUBRIPLATE Nos. 1-2-3-4



FOR HIGHER SPEEDS

Probably the severest tests for high speed lubricants occur in the textile and woodworking industries. These industries have definitely proven that machines can be run safely at higher speeds with LUBRIPLATE lubricants. With these revolutionary lubricants, there is far less replacement of parts. Burned-out bearings are held down to an unprecedented minimum. LUBRIPLATE lubricants in various densities are available for all applications.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

Write for a booklet, "The LUBRIPLATE Film", written especially for your industry.

Ill., announces a revised 63-page catalog on the design and application of hydraulic and pneumatic leather packings. Thirty-two pages of new material have been added to the engineering section.

Detergent Powder—Oakite Products, Inc., 26G Thames St., New York 6, has prepared a 20-page illustrated booklet describing a detergent in powder form which is said to be a deodorizer, as well as a cleaning and a germicidal agent. The booklet gives formula and directions for using in many industries, among them food plants.

Filter Papers—Carl Schleicher & Schuell Co., 116-118 West 14th St., New York 11, N. Y., has just issued Bulletin No. 67 covering its full line of laboratory filter papers.

Colloids and Boiler Trouble — The American K.A.T. Corp., 331 Madison Ave., New York 17, has just issued a 4-page bulletin on the use of colloids to avoid boiler troubles.

Lubrication Handbook—Fiske Brothers Refining Co., 129 Lockwood St., Nework 5, has prepared a new profusely illustrated 28-page handbook on lubrication. It gives many product characteristics and recommendations for specific lubrication applications.

Floors—A new brochure describing floor construction has been prepared by Nukem Products Corp., Buffalo 20.

Unit Heater Corrosion—D. J. Murray Manufacturing Co., Wausau, Wis., announces a 12-page booklet describing corrosion and its influence on unit heaters.

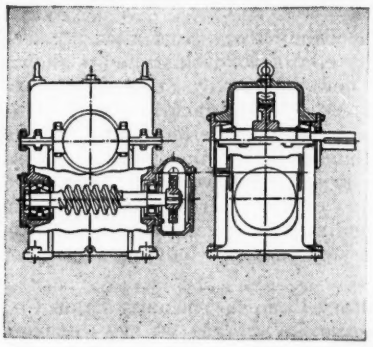
Piston Packing—Darling Valve & Mfg. Co., Williamsport, Pa., has just issued an 8-page bulletin No. 4502 that illustrates and describes composition cups for packing pistons of air and hydraulic cylinders, as well as reciprocating pumps. A number of other uses are described.

CONTROL EQUIPMENT

Controllers—Several different types of controllers are illustrated and described, contact and load circuit wiring diagrams are given and typical applications are indicated in a new 16-page bulletin published by Bristol Co., Waterbury 91, Conn.

Electric Controls — Barber-Colman Co., Rockford, Ill., announces Bulletin F-2287-1, which discusses electric controls in industrial applications. Various room, duct, immersion and remote-bulb thermostats are also described.

LUBRIPLATE No. 8



FOR HEAVY GOING

LUBRIPLATE No. 8 possesses an extremely high film strength and is just the correct density for the general run of enclosed gears (speed reducers). It is especially suitable for worm gears and other types carrying heavy loads. Typical of all LUBRIPLATE lubricants, No. 8 has exceptionally long life.

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No. 70—For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA—Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING—This is the LUBRIPLATE lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

Write for a booklet, "The LUBRIPLATE Film", written especially for your industry.

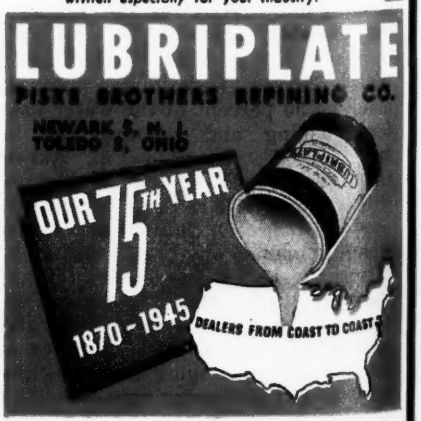

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Photo of Tip-Top Bread Personalized Dealer Sign courtesy Ward Baking Co.

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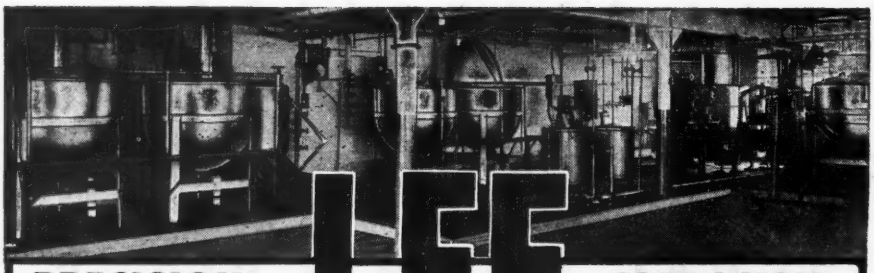

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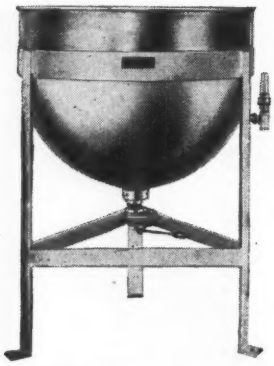

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Fabricated from all types of commercial corrosion-resistant metals and alloys. Available for quick delivery under the new priorities are standard and specially designed types for every industrial application. Wire, phone or write LEE for the NEW advanced engineered equipment used in every processing application.

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10,000,000 BAGS SEALED

IN 332 DAYS WITH THIS

Doughboy ROTARY HOT KRIMP *Sealer*

The Doughboy Sealer (illustrated) has been in continuous use under usual assembly conditions. It has sealed more than 10,000,000 bags and is still in excellent condition being operated 16 hours each day. The total cost of replacements during this period has been $35.85. This again proves the economy and efficiency of the Doughboy Sealer.

REGULAR MODEL, for cellophane and light materials **$199.50**

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Heat roll and pre-heater separately controlled

TOGGLE-JAW TYPE SEALERS

8-inch Jaws	10-inch Jaws	12-inch Jaws
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☐ Doughboy Rotary Hot Krimp Sealer
☐ Doughboy Toggle-Jaw Sealer

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Barometric Condensers—Uses, advantages and operation of both the disk-flow and the ejector-jet types of barometric condensers are explained in a new 8-page bulletin—offered by Ingersoll-Rand Co., 11 Broadway, New York 4. Photographs show applications in various industries.

Electric Tachometers—General Electric Co., Schenectady, N. Y., announces a 12-page bulletin describing and illustrating its new line of electric tachometers.

MISCELLANEOUS

Welding or Cutting Set—Victor Equipment Co., 44 Folsom St., San Francisco, Cal., has just issued a 46-page fully illustrated, booklet, describing in simple language how to assemble a welding or cutting oxy-acetylene outfit.

Carton Sealing Chart—A wall chart for shipping departments, which shows how to properly seal cartons with sealing tape, with no waste of tape or sacrifice of sealing line protection, has just been issued by the Mid-States Gummed Paper Co., 2515 South Damen Ave., Chicago 8. It graphically shows in eight steps, how the sealing lines of cartons should be protected against rough handing and other shipping hazards, with maximum safety to carton and contents at a minimum expenditure of materials.

New House Organ—"Food" is the name of the new house organ of Mojonnier Bros. Co., 4601 West Ohio St., Chicago 44. Its 24 colorful pages contain interesting and informative articles on the processing and filling of dairy and other food products.

Eliminating Corrosion — Suggestions for the elimination of corrosion and contamination are found in a new technical bulletin issued by American Pipe & Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles 54, Calif.

Consulting Chemists, Engineers—A 20-page booklet has been published by Foster D. Snell, Inc., 305 Washington St., Brooklyn 1, describing and illustrating the company's technical services.

Multi-Tier Conveyors—J. W. Greer Co., 119 Windsor St., Cambridge A-39, Mass., has released Catalog No. 45-3 which describes and illustrates multi-tier conveyors.

Rust Prevention—Johnston & Jennings Co., 864 Addison Road, Cleveland 14, Ohio, has just made available Bulletin No. R-181, which describes electrical methods that prevent rusting of steel water tanks, piping and other steel structures.

BOOKS

Analytical Technics

THE ANALYSIS OF FOODS. By Andrew L. Winton and Kate Barber Winton. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1945. 946 pages; 6½x9 in.; cloth. Price, $12.

This volume constitutes a comprehensive and authoritative compilation of practical information for practicing food analysts engaged in Federal, State or municipal inspection, in quality control in the plant, and in research and testing in the laboratory. And it is so arranged as to be useful to the student and beginner.

Of the methods described, some have been adopted by American national organizations or are standard in other countries. Those not yet accepted as "official" methods were developed in reliable laboratories and published in accredited journals. A notable accomplishment of the authors is the separation of the method proper from its entanglement with discussion and the piecing together of the parts to form a concise and usable whole.

The contents are arranged in two parts—general methods and specific ones. The first part includes microscopic, physical and chemical methods, the latter being presented under the headings of water, protein, fat, nitrogen-free extract, fiber, ash, alcohols, vitamins, natural colors, artificial colors and chemical preservatives. This may or may not be as convenient to a particular analyst as classification under the different food products, but is a long-used technic. The special methods given in the second part pertain to cereals, fats, vegetables, fruits, saccharine, alcoholic beverages, dairy products, animal foods, alkaloidal products, flavors, leaven and salt.

Introducing the parts on analytical methods is a section briefly describing the apparatus and reagents used. This will be particularly useful to the student. Illustrations of microscopic tissues are given at the beginning of the chapters, while reaction equations are included in the descriptions of the methods. As practice examples for students, typical methods are described in explicit detail.

Adding to the value of the volume is a 53-page index making it easy to locate among the 946 pages of text a particular bit of information required in an analytical procedure.

The work reflects the background of the authors. Andrew L. Winton not only has had experience as a State and Federal chemist, but he revised and enlarged Leach's "Food Inspection and Analysis." Kate Barber Winton has served as a State and Federal microscopist.

Versatile Crop

THE USEFUL SOYBEAN. By Mildred Lager. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, 1945. 5½x8½ in.; 295 pages; cloth. Price, $2.75.

The publishers describe this volume as a revolutionary cookbook, but it contains a great deal more than just recipes. The book tells the story of the soybean, its long history as one of the world's oldest foods, and its rediscovery in the western world in recent years.

The value of the book, from the food industry's standpoint, lies in its bringing together, under one binding, all the stray bits of information on this crop that have been passing about more or less loosely during the past decade. The agricultural and industrial potentialities of the soybean, springing from its high nutritional value, on the one hand, and from its very great versatility, on the other, are a challenge to the food industrialists as well as the chemist.

For those who regard the soybean solely as a feed crop, or even as a crop with many nonfood uses, the book's emphasis on its nutritional value as "a conqueror of hidden human hungers" and as a soil preservative will prove a bit of an eyeopener.

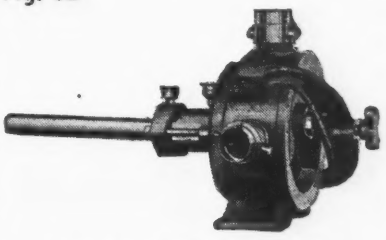
In any case, this is the complete story of the soybean along with close to 400 recipes for its use. It seems to be a good plant to know something about.

Business Analyzed

BUSINESS LEADERSHIP IN THE LARGE CORPORATION. By Robert Aaron Gordon. Published by The Brookings Institution, Washington, D. C., 1945. 367 pages; 5½x8½ in.; cloth. Price, $3.

Although this book has been ten years in the making, its publication at a time when private enterprise is very much in the spotlight is most timely. Its analysis of the organization of the large corporation

Fig. 62



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The line of Viking Rotary Pumps far exceeds any other. It is the most complete line in the world. Write today for Bulletin Series 100, which illustrates Viking Pumps widely used in the food processing industry.

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and that organization's role in business leadership carries an answer to some of the bottlenecks in our present-day economy.

The author, with the aid of the University of California and the Brookings Institution, has sought to discover who in fact are our business leaders. Are they the company executives, the boards of directors, the stockholders, the government or labor? The relationship that these groups bear to one another and to the corporate structure also is analyzed.

The business corporation as an organized human activity is stressed throughout most of the study, while the findings emphasize the key role of the salaried executive, the passivity of most boards of directors and the fact that "control" by minority groups can mean anything from complete inertia to active participation in management.

Food Engineering

PROCESS EQUIPMENT DESIGN. By Herman C. Hesse and J. Henry Rushton. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, 1945. 580 pages; 6½x9¼ in.; cloth. Price, $7.50.

The food engineer should, and often must, be familiar with such factors as the fundamentals of mechanics, machine and structural elements, and economical and manufacturing considerations related to equipment design.

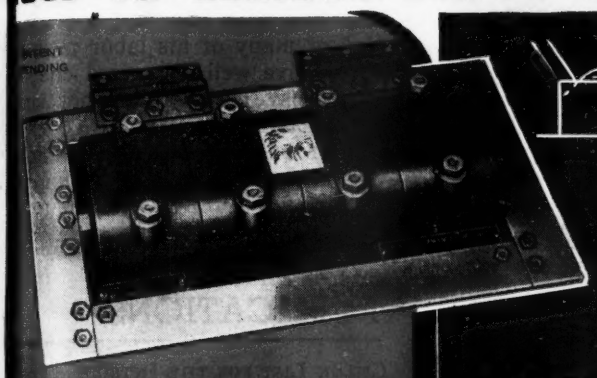
The authors of this book present these factors, especially as they are related to the process industries. The food engineer ought to find the book an effective aid in his work. He should be particularly interested in the discussions on construction materials, riveted and welded pressure vessels, piping and nonferrous construction.

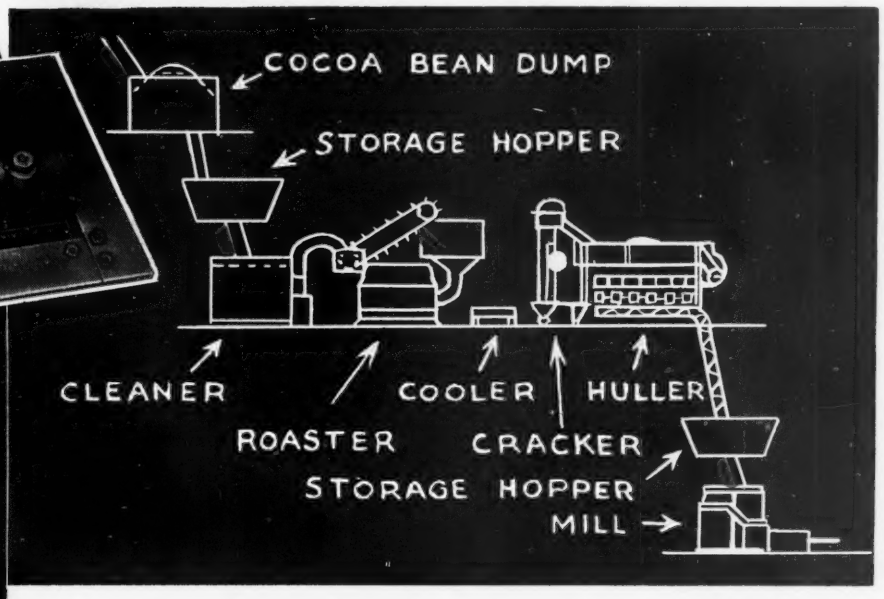
Employee Relations

HOW TO HANDLE LABOR GRIEVANCES. By John A. Lapp. Published by National Foremen's Institute, Inc., Deep River, Conn., 1945. 293 pages; 5½x8¼ in.; cloth. Price, $4.

The food industry, like most others, is giving more and more serious consideration to constructive labor policies, particularly in postwar planning. A great deal has been written of the broader aspects of this problem, but this book gets down to details. It is the result of the author's experience in handling arbitrations of labor grievances and in formulating and interpreting collective bargaining contracts.

OW TO REMOVE STRAY IRON FROM FOODS IN PROCESS





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★ **No. 5 Case Study**

CONFECTIONERY AND CHOCOLATE

ERIEZ Permanent Magnetic Separators are proving their worth in the processing lines of the leading candy and confectionery manufacturers of the country. For instance, Peter Cailler Kohler Swiss Chocolate Co., Inc. installed 5—10" Figure No. 3 Eriez Magnets in their lines and quickly followed the installation by reordering for other spots of importance, a total of four times.

A very small investment brings magnetic protection up to date. Eriez Non Electric Permanent Magnetic Separators give 100% protection against the hazard of stray iron . . . eliminate fire hazard in cocoa mills from this source . . . insure against shut downs and expensive repairs. The place to eliminate tramp iron is in the raw material before it enters into the finished product stage; for instance, corn syrup, sugar, nuts, chocolate, and such ingredients as go into the finished confectionery should be thoroughly cleaned in their raw state and, as good analysis dictates, further along in the processing line.

Notable among those using Eriez Magnets to good advantage are: Sweet's Corp. of America, The Blommer Chocolate Co., Peter Cailler Kohler Swiss Chocolate Co., Inc., Rockwood (Chocolate-Cocoa) Co., Stephen F. Whitman & Son, Inc., Bachman Chocolate Mfg. Co., Mason au & Magenheimer Confectionery, Wilbur-Suchard Chocolate Co., Inc., Hershey Chocolate Co., Confections Inc.

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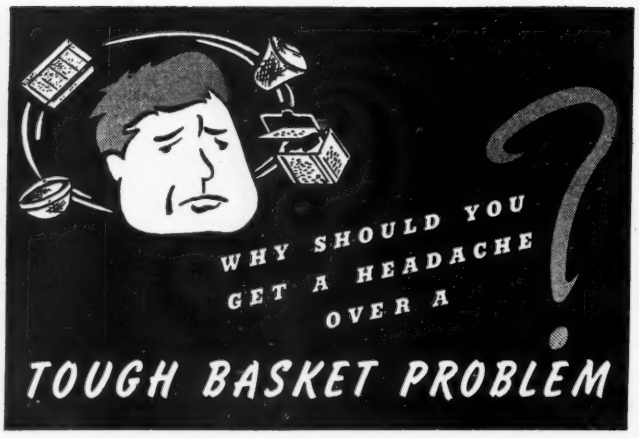

Wrap up your sketches. Accompany them with as complete information as you can scrape together on size, capacity, type of service, conditions to be encountered, etc. Send them on to "Buffalo Wire."

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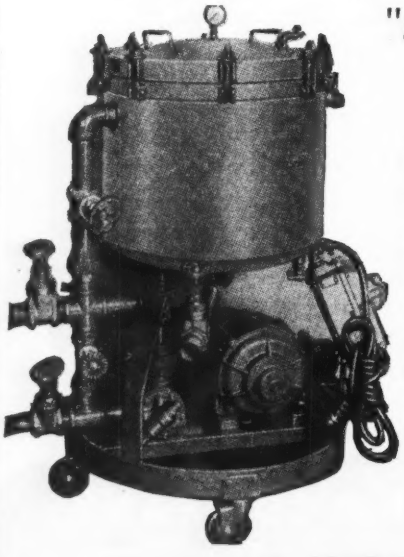

The very appearance of the Sparkler Filter bespeaks a sturdiness and efficiency that is borne out in its performance.

Hundreds of Sparkler Filters now filtering cooking oils, frying fats, fruit juices, syrups, molasses, vinegar, honey, milk, chemicals, etc., all over America are building up new standards for finished products in food processing industries.

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GOVERNMENT PUBLICATIONS

CHECK LIST FOR THE INTRODUCTION NEW CONSUMER PRODUCTS. Bureau Foreign and Domestic Commerc Economic Series No. 41. Availab from Superintendent of Document Washington 25, D. C. Price, 10 cent

TRAY MATERIALS IN RELATION SULFITED, DEHYDRATED VEGETABLE Bureau of Agricultural and Indu trial Chemistry, Department of Agr culture, Washington 25, D. C.

FEDERAL SPECIFICATIONS FOR DRUMS STEEL, TYPE 5B (FOR PETROLEU PRODUCTS), RR-D-729. Availab from Superintendent of Document Washington 25, D. C. Price, 5 cent

SEASONAL CHANGES IN FLORID GRAPEFRUIT. Department of Agricu ture, Technical Bulletin 886. Avai able from Superintendent of Doc ments, Washington 25, D. C. Pric 25 cents.

STATE LABOR LAWS FOR WOMEN WIT WARTIME MODIFICATIONS. Part III Analysis of Regulatory Laws, Pro hibitory Laws, Maternity Laws. D partment of Labor. Bulletin of th Women's Bureau No. 202-III. Avai able from Superintendent of Doc ments, Washington 25, D. C. Pric 5 cents.

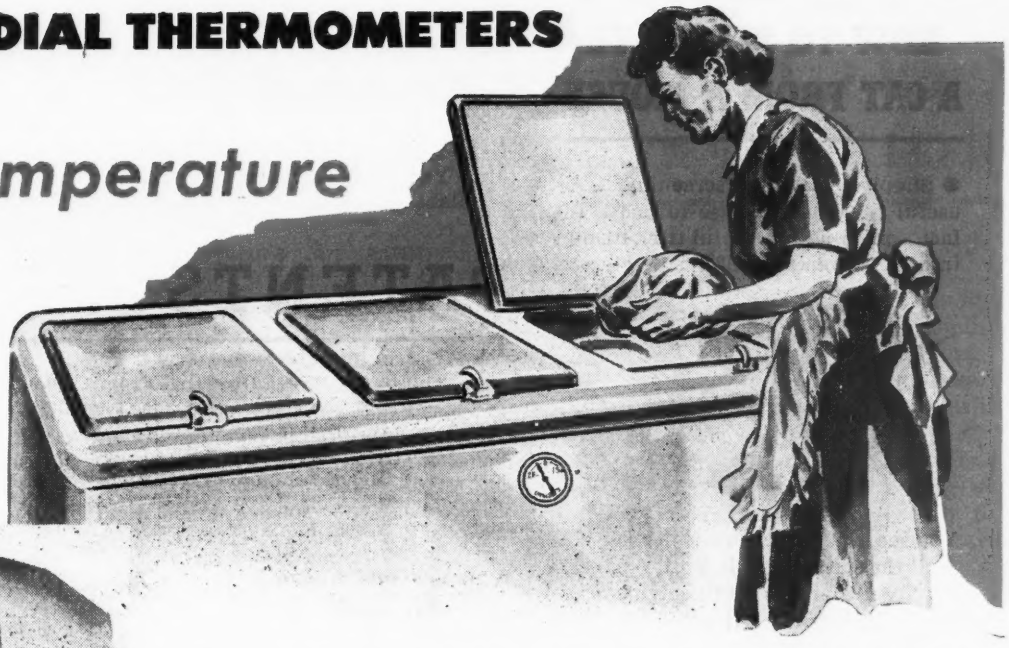
WARTIME TECHNOLOGICAL DEVELOP MENTS. A Study Made for the Sub committee on War Mobilization of th Committee on Military Affairs, Unite States Senate. Subcommittee Mono graph No. 2. Available from the Su perintendent of Documents, Wash ington 25, D. C. Price 50 cents. A list of 1471 wartime developments.

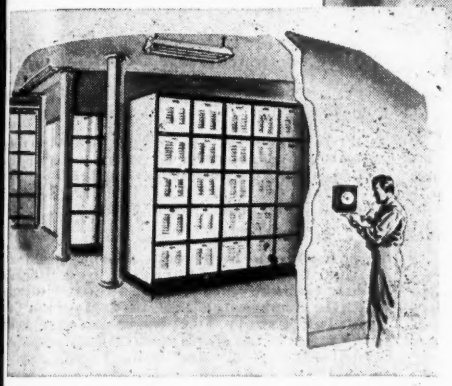
POST-WAR AGRICULTURE AND EMPLOY MENT. Department of Agriculture Miscellaneous Publication No. 56 Available from Superintendent Documents, Washington 25, D. C Price 10 cents. A statistical forecas

UNIFORM LABELS FOR CONSUME GRADES OF EGGS. By Melvin W. Bus ter and H. G. F. Hamann. Depart ment of Agriculture, Miscellaneou Publication No. 560. Available from Superintendent of Documents, Wash ington 25, D. C. Price, 5 cents.

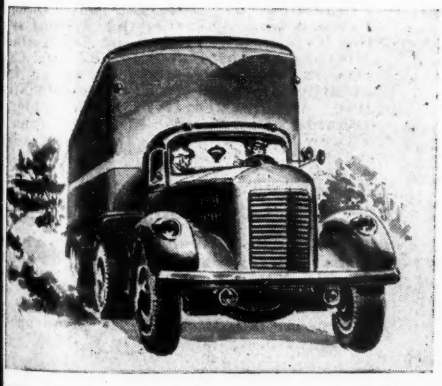
AUTO-LITE DIAL THERMOMETERS

Where Temperature Is Vital...





Continuous temperature cycles are charted by Auto-Lite Recording Thermometers. Used in food processing, cold storage, locker plants and for other applications where temperature recording is desired.



To protect tons of perishables, rolling cross-country in refrigerated trailer trucks, Auto-Lite Indicating Thermometers are mounted on the trailer front where temperature can be easily checked from the driver's seat.

Thousands of farm-families look forward to the practical benefits they expect to enjoy through ownership of a farm freezer. Cabinet makers are planning to supply these potential buyers with freezing and cold-holding units that give the utmost service and protection for frozen foods.

An important assurance of such service is an AUTO-LITE indicating thermometer, supplied as part of the cabinet equipment. Auto-Lite dial-type thermometers *remove the guess* from temperatures . . . indicate the cold facts that insure maximum safety.

Auto-Lite thermometers have no delicate parts to require frequent adjustment or repair. Operating parts, including capillary tubing and bulb, are made of non-ferrous metals, corrosion resistant. Auto-Lite's dependable service is due to exclusive design and precision manufacture . . . to Auto-Lite's long experience in making instruments of utmost reliability for automotive and aviation needs.

Prospective buyers place greater service value on equipment that offers this recognized protection. Your trademark can be placed on the thermometer dial, or it may be possible to incorporate the thermometer in your trademark design. We shall be glad to co-operate now. Write to us for further information and volume prices.

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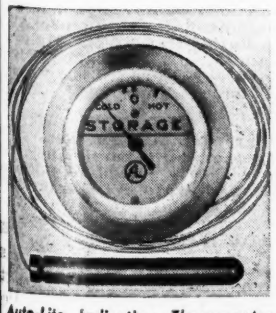
INSTRUMENT AND GAUGE DIVISION

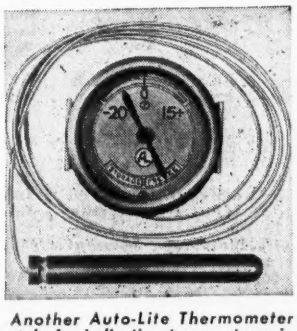
CHRYSLER BUILDING, NEW YORK 17

AUTO-LITE

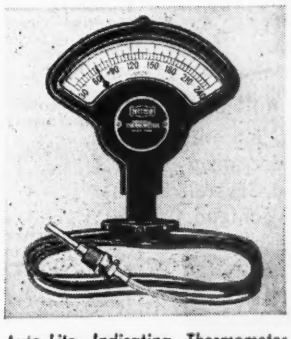
In addition to a wide range of thermometers and gauges, Auto-Lite specializes in the production of instruments of special design for use as a standard part of manufacturers' equipment. Details on request.



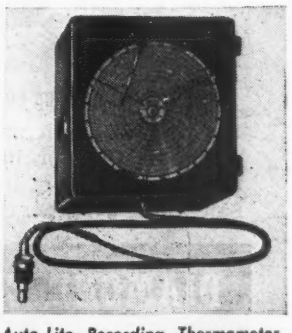
Auto-Lite Indicating Thermometer for freezer, cold-holding and dispensing cabinets. Selection may be made from a variety of designs



Another Auto-Lite Thermometer style for indicating temperatures in freezer, cold-holding and dispensing cabinets. Ask for volume prices



Auto-Lite Indicating Thermometer F-1. Well known type for food processing, locker storage, freezer rooms, refrigerated vehicles. From $20



Auto-Lite Recording Thermometer, Model 500. Bourdon tube type. High visibility chart; coverage equal to larger thermometers. From $31

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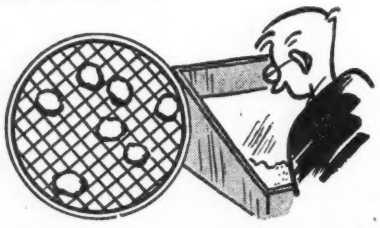
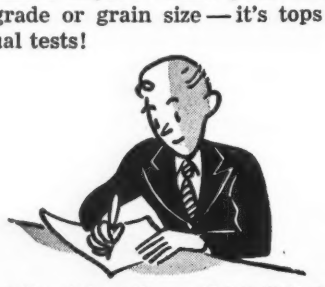


Happily for the mouse, he got results. And so do we at Diamond Crystal. That's why you can always be sure of clean screening whenever you specify Diamond Crystal. Take your choice of grade or grain size — it's tops by actual tests!



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MEAT IN THE TWO WORLD WARS. Department of Commerce, Industrial Reference Service, Part 5. Available from Superintendent of Documents Washington 25, D. C. Price, 5 cents

PATENTS

Zein Solutions Made Directly From Gluten—Roy E. Coleman, Chicago, Ill., to Time, Inc. Nos. 2,377,290 and 2,377,291. May 29, 1945.

Molasses Mixed With Alfalfa Having 3 Percent Moisture Content to Make Dry Molasses Food Composition—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,377,360. June 5, 1945.

Fats and Oils Stabilized Against Rancidity by Addition of Solution of Gum Guaiac in Higher Fatty Acid Partial-glyceride—Leo C. Brown, to Industrial Patents Corp., Chicago, Ill. No. 2,377,610. June 5, 1945.

Limed Sugar Solution Treated With CO_2 Under Positive Flow Control—Wilmot H. Kidd, Sharon, Mass., to The Foxboro Co., Forboro, Mass. No. 2,377,634. June 5, 1945.

Liquid Egg Whites Concentrated by Heat Treatment To Give Uniformly Viscous Consistency in Sufficiently Short Period of Time To Avoid Deterioration—Clinton H. Parsons and Leon D. Mink, to Industrial Patents Corp., Chicago, Ill. No. 2,377,644. June 5, 1945.

D-Psicose Produced During Fermentation of Molasses by Yeast — Louis Sattler, to New York Sugar Trade Laboratory, Inc., New York, N. Y. No. 2,377,653. June 5, 1945.

Wheat Milled to Recover High-vitamin Fraction Having Crude Fiber Content Lower Than Whole Wheat Flour—John S. Andrews and Reginald C. Sherwood, St. Paul, Minn., to General Mills, Inc. No. 2,377,741. June 5, 1945.

Extracted Soya Protein Slowly Frozen and Subsequently Thawed To Change Physical Characteristics—Robert A. Boyer, Dearborn, and Joseph Crupi and William T. Atkinson, Detroit, Mich., to Ford Motor Co., Dearborn, Mich. No. 2,377,853. June 12, 1945.

Soya Protein Made Into Aqueous Spinning Solution—Robert A. Boyer, Dearborn, and William T. Atkinson and Charles F. Robinette, Detroit, Mich., to Ford Motor Co., Dearborn, Mich. No. 2,377,854. June 12, 1945.

Soya Protein in Aged Alkaline Solution Converted Into Synthetic Wool—Oskar Huppert, Chicago, Ill., to Glidden Co., Cleveland, Ohio. No. 2,377,885. June 12, 1945.

Upper and Lower Crust Edges of Filled Unbaked Pies Crimped by Mechanical Means—Lloyd J. Harriss, Kenilworth, and Bernard Lambers, Oak Park, Ill., to Lloyd J. Harriss. No. 2,377,936. June 12, 1945.

Water-soluble Egg Albumen Made From Impure Watery Egg Shell Juice—Frederick F. Pollak, Yonkers, N. Y., to Domestic Egg Products, Inc., New York, N. Y. No. 2,377,961. June 12, 1945.

Oil Extracted From Seeds at Elevated Temperature With Solvent Consisting of Approximately 75 Percent Ethyl Alcohol and 25 Percent Isopropyl Alcohol—Philip A. Singer and Harold J. Deobald, Peoria, Ill., to Allied Mills, Inc. Nos. 2,377,975 and 2,377,976. June 12, 1945.

Whole Fruit Containing Pits Mechanically Manipulated to Break Natural Bond Between Pit and Meat—Ralph Polk, Sr., and Ralph Polk, Jr., to Polk Development Co., Tampa, Fla. No. 2,378,101. June 12, 1945.

Citrus Fruit Juices Concentrated to Total Soluble-solids Content of Between 72 and 82 Percent—Jorgen Diet Bering, Pasadena, Calif. No 2,378,53 June 19, 1945.

Viscosity of Gelatin Increased by Addition of Deacetylated Chitin—Edwar F. Christopher, to Industrial Paten Corp., Chicago, Ill. No 2,379,065. Jun 26, 1945.

Citrus Material Prepared for Dehydration by Treatment With Compoun Containing Carbonyl Radical—Haro K. Derby, Berkeley, Calif., to F. Booth Co., Inc., San Francisco, Cal No. 2,379,068. June 26, 1945.

Grain Kernels Freed From Bran a Husk Layers by Abrasion and Mechanical Impact and Subsequent Flotati While Suspended in Fluid Medium Co taining Finely Divided Nontoxic Soli—Victor Rakowsky, Joplin, Mo., a Janis R. Reid, Madison, Tenn. No. 2,379,184. June 26, 1945.

Mold Growth Inhibited by Action Aliphatic Monocarboxylic Compoun—Chester M. Gooding, Staten Islan N. Y., to Best Foods, Inc., New Yor N. Y. No. 2,379,294. June 26, 1945.

Wheat Flour Given Improved Baki Properties by Presence of Chlori Formed and Absorbed by Wheat Du ing Tempering Treatment With Dilu Mixture of Chlorine Dioxide and Chlorine in Air in Presence of Added No volatile Inorganic Water-soluble Alk line Agent Reactive With Chlori Dioxide to Form Chlorite—John Baker, Montclair, N. J., to Nova-de Agene Corp. No. 2,379,335. June 1945.

Canadian Patents

Grain, to Be Milled Into Flour, Treat or Tempered With Water Containi Edible Surface Tension Depressant Give Selective Moistening of Bran Co—Martin H. Heeren, Chicago, Ill., International Milling Co., Minneapol Minn. No. 427,396. May 8, 1945.

Ground Coffee Pressure-packed Und Vacuum—Otto A. Schmitt, Syracuse, Continental Can Co., Inc., New Yor N. Y. No. 427,649. May 22, 1945.

Bottles and Like Washed and Rins in Automatic Continuous Manner Hard Water, Without Scale Formati on Conveyor, by Addition of Sm Quantity Alkali Metal Pyrophosph and Orthophosphate to Caustic Alk Washing Bath—Harry H. Hull a Joseph Janota, Jr., Chicago Heigh Ill., to Diversey Corp., Ltd., Toron Ontario, Canada. No. 427,652. May 1945.

Fresh Meat Compressed Into Mo Frozen, Tempered to Not Higher Th 32 Deg. F., Thinly Sliced and Form Into Laminated State With Interposi Layers of Caul Fat—Jerry Heffern Edmonton, Alberta, Canada. No 4 933. June 5, 1945.

Meat Heat-processed in Seamless C ton Formed of Hard Coated Carboa Having Outer Layer Formed of Da Heat-absorbing Cardboard—Christ pher A. Pemberton, Toronto, Ontar Canada No. 428,072. June 12, 1945.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

FOOD CHEMISTRY

Thiamine in Cereals

SIMPLER than the original method and not requiring expensive apparatus, a revised colorimetric method for thiamine should find ready application. By this method, 12 to 15 determinations may be conducted by a single analyst in an 8-hour working day.

A clear extract of the free vitamin is obtained by refluxing with sulphuric acid, adjustment of the pH to 4.5 with sodium acetate and digestion of the starch with diastase. The thiamine in cereals, other than yeast-leavened products, is present almost entirely in the free, or nonphosphorylated, form. Starch is digested by diastase to facilitate extraction of the vitamin.

Insoluble material is removed by filtration, and the clear filtrate is adsorbed on a zeolite column at room temperature and the thiamine then eluted with hot potassium chloride, using steam in the column jacket. Thiamine in the eluate is determined by reaction with diazotized p-aminoacetophenone, extraction of the insoluble red pigment with xylene, and comparison with a standard similarly treated.

The method is applicable with precision to most low-potency materials but is not recommended for low-potency materials which have a high protein content, such as egg, beef muscle and blood.

Digest from "Simplified Colorimetric Determination of Thiamine in Cereal Products," by M. Hochberg, D. Melnick and B. L. Oser, *Cereal Chemistry*, vol. 22, 83-90, March, 1945.

STORAGE

Moisture in Storage

HUMIDITY equilibria for foodstuffs may be determined readily by exposing samples in closed containers, such as screw-top glass jars, over sulphuric acid solutions giving suitable atmospheres. Use of three solutions with equilibria near that of the foodstuff will be sufficient for most purposes. Results usually can be obtained by plotting readings made at intervals during a two-day period at constant temperature and extrapolating to 0 weight gain, rather than waiting to bring the material to equilibrium.

The natural humidity level of foodstuffs is important for storage. Besides those foods which must be kept at low moisture levels, many others must be protected from moisture gain above the point permitting mold formation. The authors give the low limit for bacterial growth as 95 percent; yeast, 90 percent; and mold, 80 percent. But they state that some osmophilic yeasts are reported to grow down to 69 percent moisture, and mold has been observed below 75 percent.

Causes for variation among commodities are unknown and are probably complex. For instance, for a food rich in carbohydates the main factors are the water content and the ratios starch:sucrose:monosaccharides.

Digest from "Equilibrium Relative Humidity of Foodstuffs," by E. W. Hicks, *Food Preservation Quarterly* (Division of Food Preservation, Commonwealth Council for Scientific and Industrial Research, Australia), vol. 4, No. 4, 3-5, December, 1944.

Coatings on Fruit

SKIN coatings on fruit may lead to losses in storage, and such coatings should be applied only after careful experiment.

Apples for treatment should be at optimum maturity for cool storage when picked, free from injuries and of normal size. Treatment should be avoided during hot weather.

Wax emulsions are most effective for reducing weight loss, but have caused calyx injuries to certain varieties of apples because of the concentration of soap required for their emulsification.

Efficiency and toxic effect of an oil emulsion depend more on the emulsifying agent than on the oil itself. A heavy paraffin oil has been found more effective than lighter mineral oils or vegetable oils. Emulsions with low concentration of soap are most effective, but must resist dilution. Breaking of the emulsion results in deposition of a heavy layer of oil which severely restricts diffusion of oxygen and results in development of abnormal alcoholic flavors.

The authors, connected with the Department of Agriculture, New South Wales, state that it is known that under favorable conditions certain coatings will prolong the storage life of a particular variety of apple grown in certain localities, but investigations have not yet reached the stage where it is possible to recommend a coating which could be applied successfully to all varieties of apples under various storage conditions.

Digest from "Extending the Storage Life of Apples with Skin Coatings," by S. A. Trout and E. G. Hall, *Food Preservation Quarterly* (Division of Food Preservation, Commonwealth Council for Scientific and Industrial Research, Australia), vol. 4, No. 4, 8-9, December, 1944.

FREEZING

Fish Freezing

SALT activates the development of fat rancidity in herring, the oxidation being catalyzed by substances present in the herring itself. Haemoglobin and cytochrome have been identified as the catalysts.

These results, checked by tests on herring oil-and-water emulsions, with and without the herring muscle, explain the rapid rancidification of brine-frozen herring and of frozen kippers.

Protection of the fish fat from oxygen is obtained as long as the skin is unbroken and undried, but moisture-vapor-proof wrappers are not sufficient to prevent desiccation and porosity of the skin. Dipping in water after freezing, to form a thick ice glaze, with storage in high humidity atmosphere, is recommended.

In laboratory tests, very quick freezing (brine at –2 deg. F. or moving air at –60 deg. F.) gave better storage life, but moving air at –14 deg. F. was satisfactory. Storage at –22 deg. was satisfactory, –4-deg. storage was not.

In a pilot-scale operation, multiplate and air-blast-frozen fish, in 7-lb. blocks, were glazed by dipping in water before storing. After holding at –23 deg. F. for six months, the fish were found to make good kippers when split and treated immediately after thawing. The kippers kept as well as those from fresh fish.

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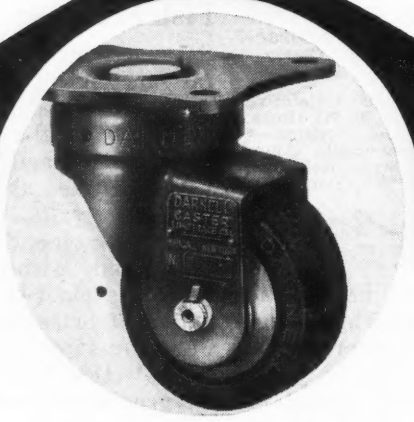

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Herring should be cleaned if they are very dirty, otherwise not.

Cooking before freezing results in very poor storage life.

Holding of the fresh-caught fish in ice for 24 and 48 hours before freezing had only a slight adverse effect on rancidity, but led to stale and unpleasant flavors after a few months' frozen storage, even at –18.5 deg. F.

Digest from "Cold Treatment of Herrings," by A. Banks, *Food*, vol. 14, 151-55, June, 1945.

BAKING

Fermentation Atmosphere

CABINET fermentation has been adopted by some bakers in the belief that it results in the use of shorter sponges.

In tests simulating bakeshop conditions, an atmosphere with 15.5 to 25.0 percent CO_2, 15.5 to 14.0 percent O_2 and 69.0 to 61.0 percent N_2, for a 3-hour sponge, produced better bread than the control which was fermented in normal air. But other atmospheric compositions which were tried produced bread that was not as good as the control.

When a closed glass jar equipped with small vent tube was used to retain the CO_2 produced by the sponge, bread quality was best with a 3-hour fermentation.

Fermentation under a pressure of 5 p.s.i. resulted in a slower rise and less height than when the sponge was fermented at normal atmospheric pressure.

Digest from "An Investigation of Shorter Bread Sponges," by H. C. Johnson, *Cereal Chemistry*, vol. 22, 255-60, May, 1945.

PACKAGING

Shelf-life Predictions

CALCULATIONS based on experimentally determined characteristics of the package and on weather data can replace slow and costly field tests in predicting shelf life, at least for products in which the shelf life is dependent on the moisture conditions. The method has been worked out for cereals.

An equation is derived which takes into account the permeability of the package, the vapor pressure of the atmosphere and the vapor pressure of the contents. This is used in connection with the permissible moisture content of the food.

For simplicity, permeability is expressed in terms of the fabricated package per unit of vapor-

Things to look forward to:

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But eye-beauty isn't its only beauty. It protects the product better. Dried fruits stay moist and tender longer when packaged in Alcoa Aluminum Foil. Moisture content is locked in more securely than with other wrappers.

For the perfect combination of beauty and protection for dried fruits—or any other product that is affected by moisture gain or loss—talk to your package designer or supplier about using Alcoa Aluminum Foil.

For a color picture of this package, write ALUMINUM COMPANY OF AMERICA, 1845 Gulf Building, Pittsburgh 19, Pennsylvania.

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Phillips A. Hayward, author of the volume on Wood in Chandler Cyclopedia, says that Cypress is "easy to work, available in large dimensions, and resistant to decay". It is also "resistant to changes in moisture, resistant to acids, and imparts neither color nor taste."

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pressure difference, which can determined in the laboratory.

The vapor pressure of a cere varies with the moisture conte and slightly with the temperatur so that a correction must be ma for the change in value.

The average vapor pressure the atmosphere can be obtained f many areas from Weather Bure temperature and humidity record

It is necessary to provide curv for storage starting each month, other interval, throughout the yea to cover the different temperatur humidity cycles. The authors d scribe derivation of 12 curves fo each of 11 markets for 1 cereal.

Utility of the method is esta lished by comparison with curv plotted from actual shelf life tes in the same area. Good agreemer was shown in most localities. I San Francisco, the vapor-pressur variation is less, and the influenc of temperature becomes an impo tant factor in the curve, with les ened agreement on the assumptio of a constant temperature of 7 deg. F. In most of the other place the summer humidity is so grea that it is safe to ignore the tem perature effect.

Digest from "Determination of She Life of Packaged Cereals," by C. E. Fe A. C. Buechele, L. F. Borchardt, R. Koehn, F. A. Collatz and F. C. Hild brand, *Cereal Chemistry*, vol. 22, 261-7 May, 1945.

CANNING

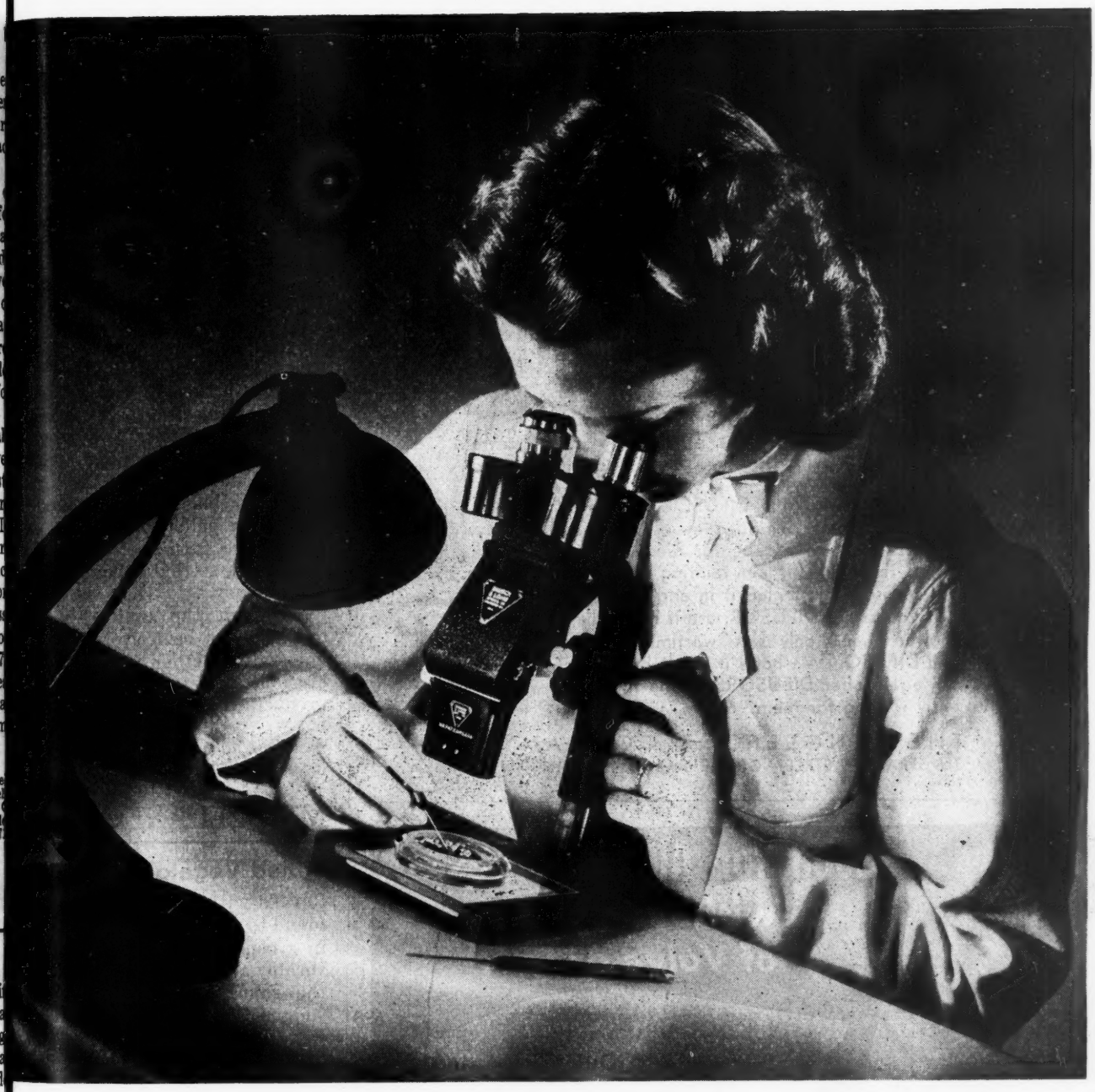
Continuous Operation

RECENT British developments i canning technic include a specia can adapted to dry heat processing

In order to obtain the interna strength required, the can is mad "rectangular," with rounded cor ners, 4½x3x2½ in. Can bodies ar in one piece, without soldered seam A reinforcing ridge runs down th center of each side and across th bottom. These ridges are so de signed that they can be used a guides for separating strips t form a 4-compartment can. A simi lar cross arrangement of reinforc ing ribs is formed in the double seamed lid.

Closed cans may be stacked on on the other, with the reinforcin ridges matching. Units 4-high with 12 cans in each layer, can be fastened together with wooden o metal trays top and bottom, fo shipment, storage and display.

Because there is no soldered seam, the material from which the can is made may be lacquered bright steel strip, stainless steel



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aluminum, clad steels, or any other metal capable of being worked.

The body-forming machine operates on strip metal. The formed bodies are discharged onto a double conveyor which carries them to filling stations and on to the vacuum closer. Closed cans are automatically dipped in a lacquer bath and drained.

They then pass slowly through a processing oven operating in temperature zones, the first to raise the temperature as rapidly as possible as long as the material can accept this high input, the second to permit a slower input while heat is penetrating into the pack and the third to accomplish the necessary holding at the processing temperature. Emerging cans are cooled by an air blast and assembled in the 48-can pallet loads.

Lids are furnished lithographed or printed, so that other labeling is unnecessary.

Although the article says the method "has been evolved" it does not state whether it is now in operation, nor for what particular products it is adapted.

Digest from "A New Canning System," *Food Manufacture*, vol. 20, 169-73, May 1945. (Published in London)

MISCELLANEOUS

Salted Vegetables

BRINES with 18 percent NaCl were found to preserve several vegetables in a condition which compared favorably with the product canned at the same time. Vegetables were judged after freshening and cooking, the holding period being 4 to 6 months.

Whole kernel corn, blanched by heating 12½ minutes at 190 deg. F., and snap beans blanched for minutes at 212 deg. F., require no addition to the 18 percent salt brine. Whole unblanched, unpeeled beets in this brine had a good flavor when cooked, but were white on the outside to a depth of 2 to 3 mm.

Acetic acid, 0.3 percent, reduced microbial counts in the 18 percent brine for carrots, which were best when washed, diced and blanched in steam for 5 minutes at 212 deg. F. Acetic addition is also recommended for spinach.

In all brining experiments, loss of ascorbic acid was very great, carotene loss being relatively less but still considerable.

Digest from "Salting Beets, Carrots, Corn, Green Beans and Spinach," by F. W. Fabian and C. K. Wadsworth, a reprint from *Fruit Products Journal*, April, 1945, distributed by Diamond Crystal Salt Co., Inc.

FORMULAS FOR FOODS

FORMULA NO. 545

Salad Dressing—II

Formula No. 543, published in July, 1945, contains complete directions for a dressing containing 20 percent oil. For a 35 percent oil dressing, the same starch paste should be used, with a higher fat emulsion base:

Frozen egg yolk (10 percent sugar)	2 lb. 12 oz.
Granulated cane sugar	1 lb. 8 oz.
Salt	1 lb.
Dry mustard	4 oz.
Water	1 lb. 8 oz.
Vinegar, 5 percent acid	8 oz.
Salad oil*	17 lb. 8 oz.

*Preferably cottonseed or corn oil

Directions

Emulsify as directed in the preceding formula.

To make the finished dressing, use equal weights of this emulsion base and the starch paste.

Formula from National Starch Products, Inc.

FORMULA NO. 546

Malted Chocolate Cookie

Whole eggs	1 lb. 4 oz.
Enzyme-converted corn sirup	1 lb. 8 oz.
Malt	1 lb. 8 oz.
Shortening	2 lb. 12 oz.
Granulated sugar	4 lb.
Full-fat soya flour	1 lb. 8 oz.
Salt	2 oz.
Soda	1 oz.
Melted chocolate	1 lb. 8 oz.
Water	2 lb. 12 oz.
Cake flour	5 lb.
Baking powder	1½ oz.
Nuts, chopped	1 lb. 8 oz.

Directions

Cream together until light the eggs, corn sirup, malt, shortening, sugar, soya flour, salt and soda. Add the melted chocolate and mix in well. Stir in the water, then the cake flour and baking powder sifted together. When smooth, mix in the nut meats.

The temperature of the dough should be between 70 and 75 deg. F. The cookies can be deposited like rock cookies or bagged out with a large plain tube on lightly flour-greased pans and flattened.

Baking temperature should be 375 deg. F., with little bottom heat.

This is a suggested formula and must be tested under the proposed conditions of manufacture. Adjustments of salt and soda, and of the water are probably required.

Formula from A. E. Staley Mfg. Co.

FORMULA NO. 547

Baked Apple Cake

High-grade cake flour	5 lb.
Sugar, fine granulated	6 lb.
Hydrogenated shortening	2 lb. 4 oz.
Salt	2½ oz.
Baking powder	3¼ oz.
Soda	½ oz.
Milk powder	3 oz.
Nutmeg	¼ oz.
Whole eggs	3 lb.
Water	4 oz.
Apples	5 lb.

Directions

Mix for 1 minute on low speed the cake flour, sugar, shortening, baking powder, soda, powdered milk and nutmeg. Add the eggs and water, mixed together, and mix for 5 minutes on medium speed, scraping the bowl once.

Remove cores from the apples, but do not peel. Run through a meat grinder, using a coarse cutter. (Do not chop the apples.) Dissolve the salt with the ground apples. Add all at once to the batter and mix 6 minutes on low speed, again scraping the bowl once.

This may be baked as loaves or layers, or as cup cakes. Scale 9 oz. for a 7-in.-deep layer, 12 oz. for an 8-in. layer. Bake layers and cups at 390 to 400 deg. F., loaves at 375 to 380 deg. F.

Formula from Lever Brothers Co.

FORMULA NO. 548

Pie Crust Mix

Cake flour	8 lb.
Bread flour, low gluten	2 lb.
Sugar	10 oz.
Salt	3 oz.
Baking powder	2 oz.
Hydrogenated shortening, high melting point	6 lb. 8 oz.

Dry Mix

Sift the sugar, salt and 1-oz. of baking powder through the bread flour. Blend with the cake flour.

Have all the ingredients cold. Place in the mixer 2½ lb. of shortening. Into this blend 1-oz. of the baking powder. Add 2½ lb. of the flour blend and mix until it forms a pasty mass. Then add the remainder of the flour and work until smooth. Add the remainder of the shortening, half cut into small pieces about the size of peas and the rest somewhat larger.

To Make Up

For one 8½ to 9 in. pie tin, use 8 oz. of the mix. Add 3 to 4 oz. of water, which may be cold or boiling, as desired. Let stand in the refrigerator for an hour or so before rolling, if possible. This not only improves the rolling qualities but the color when baked.

Formula from Laura K. Track.

FORMULA NO. 549

Banana Cookies

Sugar	3 lb.
Emulsifying shortening	2 lb. 8 oz.
Salt	1¼ oz.
Soda	¾ oz.
Nutmeg	¼ oz.
Cinnamon	¼ oz.
Ripe bananas	3 lb. 12 oz.
Whole eggs	1 lb. 4 oz.
Vanilla	¾ oz.
Rolled oats	1 lb. 8 oz.
Nutmeats	1 lb.
Pastry flour	2 lb.
Bread flour	1 lb. 4 oz.

Directions

Cream until light the sugar, shortening, salt, soda and spices. Add the bananas and mix thoroughly, then add the eggs and vanilla, while mixing. Mix in the rolled oats and nutmeats, which should be coarsely chopped. Finally, add the flours, mixing only enough to incorporate.

Bake on greased and dusted pans. Use a canvas bag without the tube to allow the nutmeats and oatmeal to pass through easily. Drop very lightly on the pans, allowing 12 oz. of batter for a dozen cookies.

Bake at 385 to 400 deg. F. for about 15 minutes. Be sure not to overbake.

Formula from Research Bakery Division, Swift & Co.

Correction

An ingredient was omitted from the list for Formula 534, Peanut Fluff Cake, published in May, 1945. Please add: Peanut butter...1 lb. 8 oz.—THE EDITORS.

INSECTICIDES THAT KILL QUICKLY!

West Insecticides possess an exceptionally high relative killing power when tested by standard recognized methods. That they prove economical when used as directed is being demonstrated by the thousands of users in all parts of the country with various problems who report that the quantity of West Insecticides required per cubic foot of room space is extremely low.

ADVANTAGES OF WEST INSECTICIDES

1. *Positive action on a wide variety of insects.*
2. *Stability: Will not deteriorate in storage*
3. *Uniformity: Manufactured by a controlled chemical process.*
4. *Clarity, Non-Corrosive and Non-Staining Properties.*
5. *Non-Injurious: When used as directed as an insecticidal agent, these insecticides are known to have no health hazard.*

SEND FOR FREE BOOKLET

WEST DISINFECTING Company

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What Technology Means

(*Continued from page* 93)

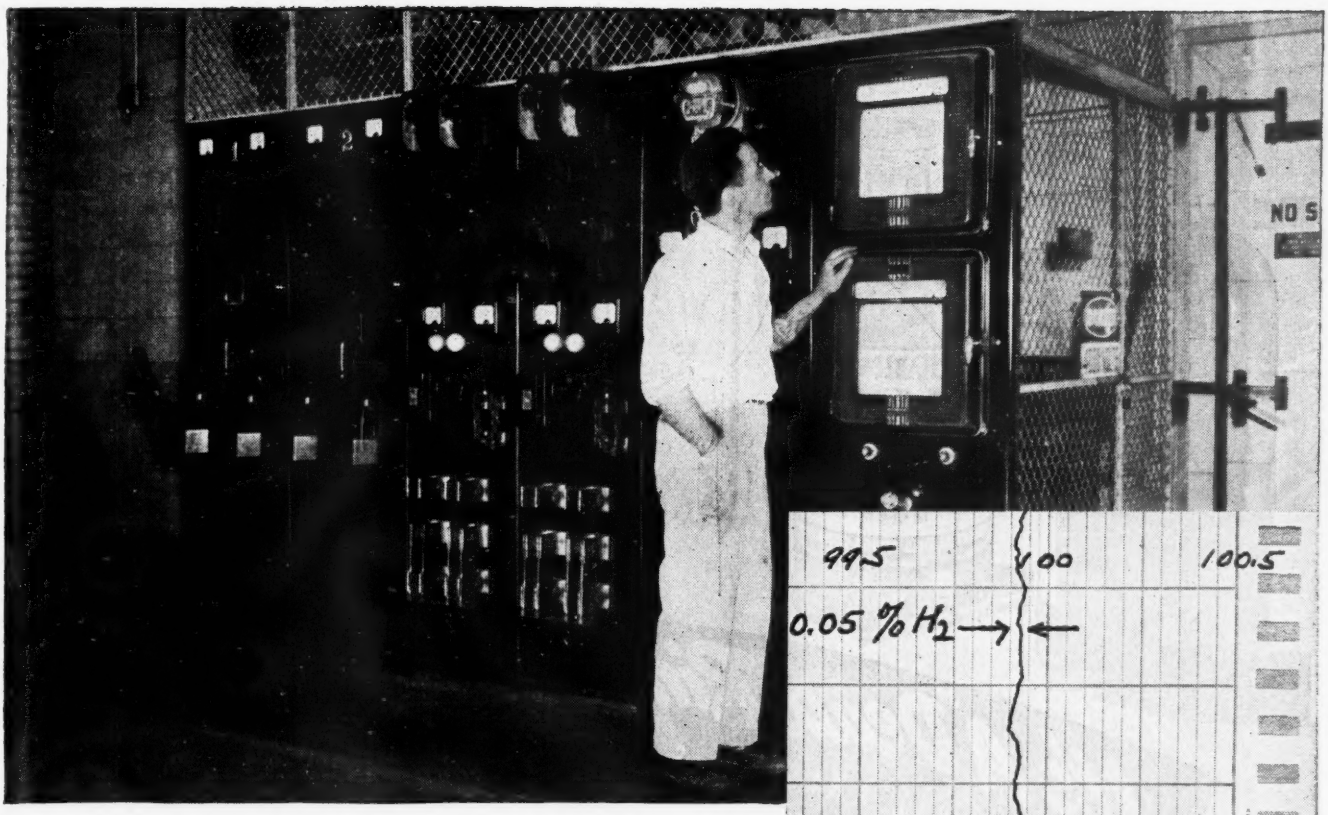
lb. of the cereal. There are many subtle ways of evading the truth, and it is the duty of every food technologist to be uncompromising in his opposition to any such practices, intentional or otherwise.

Another notable trend in cereal advertisements is the use of technical nutrition data and recipes, and the offer of cookbooks and recipe folders. In advertisements directed to pediatricians, home economists, dieticians and institutional users, major emphasis is placed upon the nutritional value of the cereal and its function in the dietary. Data for the preparation of these advertising and sales aids are furnished by technologists.

Even the legal department needs the food technologist. It is practically impossible to have every single package of enriched cereal go out at its advertised vitamin potency. Sooner or later a government inspector will find a package below claim. The technologist can help the legal department frame an adequate defense, assuming, of course, the technologist has exercised reasonably adequate control in the first place. The wording of labels can be settled best by close cooperation between the legal and technical departments. And the same applies to cases involving damage suits for alleged poisoning and similar claims.

From what has gone before, it is evident that the cereal industry must have the food technologist to aid in selecting raw material, to control its processing, to guard its product quality, to assist in advertising, sales and legal problems, to develop new products and to anticipate future scientific trends and developments. No man or group of men can perform these functions efficiently without intimate knowledge of the aims and objectives of management. Only management can know these in all their many ramifications. Therefore, the food technologist should be a part of management. In the long run, neither law, finance, sales nor advertising will exert any more influence on company success than will technology. These others are universally a part of management. It is high time the food technologist be included.

As a part of management, the technologist must be able to transmute scientific knowledge to plant practice. He must be practical. He must be able to understand the



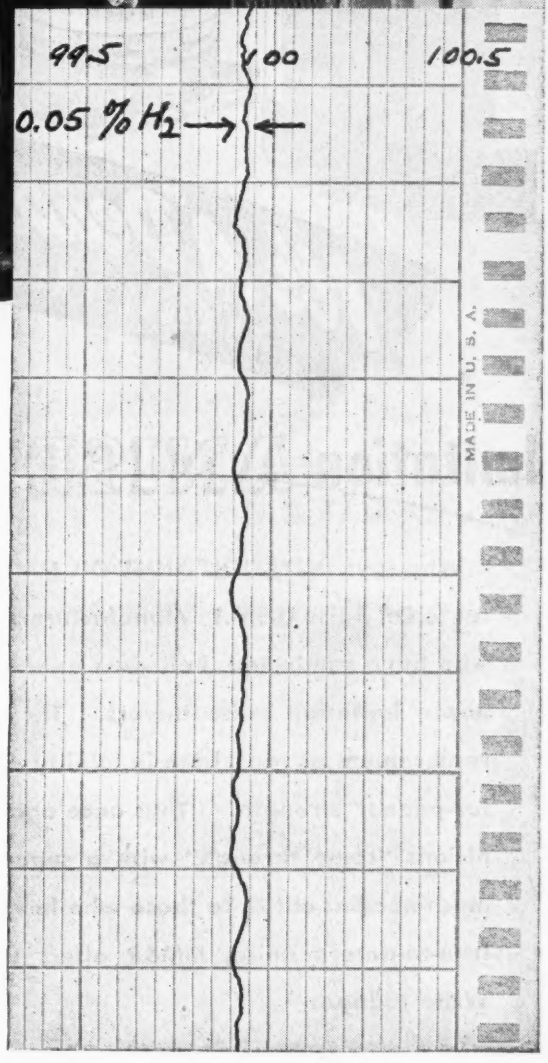
Control panel for water-electrolysis process, at The Best Foods Inc., Bayonne, N. J. Operator is looking at Micromax Hydrogen-Purity Recorder, which would sound the alarm if air or oxygen should get into the gas. The lower Micromax similarly protects oxygen against hydrogen or air.

MICROMAX HELPS "BEST FOODS" KEEP HYDROGEN PURE

The vital job of protecting hydrogen gas against contamination by air can't of course be handled entirely by a machine; constant watchfulness by a careful, experienced staff is a "must".

The staff's work can, however, be made simpler and easier to supervise if there's a Micromax Gas-Analysis Recorder to consult. For this Recorder keeps a watch which is not only constant and sensitive but is highly dependable. Being electrically driven, Micromax operates as long as the rest of the plant has power. It requires only a few minutes care a day, which a process operator can give. Its wide-scale record can be removed as often as desired—every shift, every day, or when the 40-yard roll is exhausted. In every way, Micromax is a complete, easy-to-use, valuable help for the gas-plant. If you have a problem in which it might help, we suggest you call in our engineeering service —by mail or in person, as you prefer.

Jrl. Ad N-91-0880(2)



Full-size portion of Micromax Chart, showing the amount of detail which the record reveals even when gas purity is between 99.9 and 99.95 per cent. This extreme sensitivity gives a big safety factor in operation of signals and alarms.

LEEDS & NORTHRUP COMPANY, 4912 STENTON AVE., PHILA., PA.

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✡ **Who says IMITATION ANISE OIL MM&R is practically identical to Oil Anise U.S.P.? *Manufacturers* say so—manufacturers who have conducted their own exhaustive tests with half a dozen imitation anise flavors. They hail MM&R's quality replacement as tops, both in fidelity of flavor, and in pound-for-pound* strength. ✡ Thus once again MM&R's flavor technicians "come through" with a superior replacement for a much-needed oil! ✡ To those who have not yet used MM&R's true-to-nature anise, MM&R offers a free testing sample. Write today.**

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Magnus Means Reliability

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polysyllabic words of the college professor and still be able to work with the miller manager whose motto is "get it done," or with the treasurer who insists that, to remain in business, income must exceed expenditures. He must have the ability to recognize in laboratory experiments the germ which can be developed into new and better foods. He must be a creator of ideas—logical, practical ideas—and have the ability to present them to his fellow executives in such a manner as to command their respect, confidence and acquiescence. Finally, he must drop his aloofness and his sometimes assumed air of intellectual superiority. E. C. Williams *(Chem. Eng. News,* vol. 23, 324-9, 1945) expressed it in these words:

"The success of this integration depends to the largest extent upon the understanding and vision of the top executive of the organization, but it depends equally on the understanding and ability of scientific leadership to build bridges between the scientific, operating and commercial divisions of the organization. There should be no 'Keep Out' signs around the technical departments, nor jealous guarding of territory."

So, let the food technologists—that queer blend of scientists, engineers, biochemists and economist—resolve to take down the barriers and build bridges between science, production operations and sales, so that the free passage of ideas and information across them will result in the creation of improved flavor and more economical and more nutritious foods.

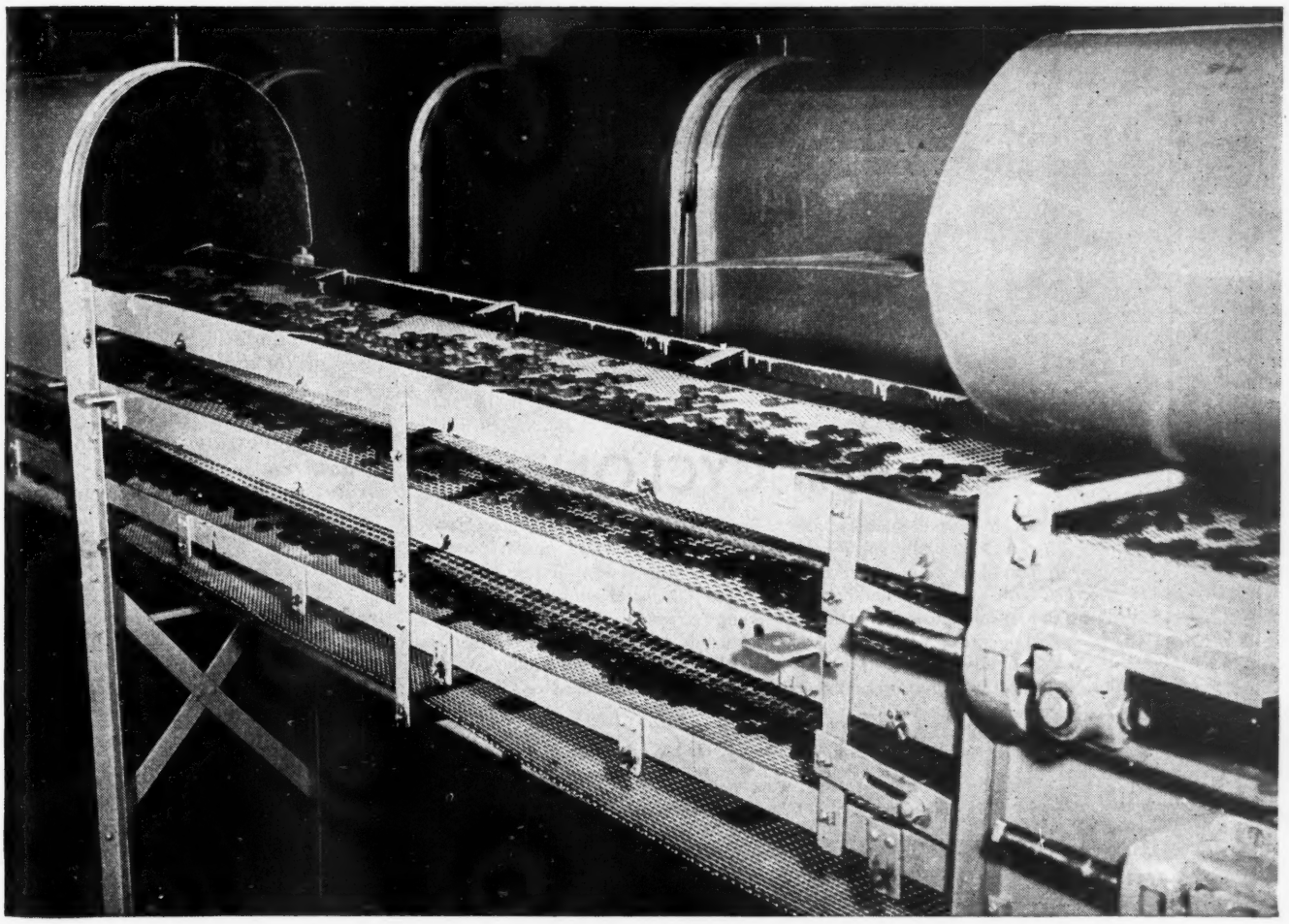
—End—

Oil of Savory

(Continued from page 99)

on sunny and calcareous arid hillsides of southern France, especially in the Alpes-Maritimes. It is a hardy, shrub-like perennial attaining a height of 8 to 14 in., with small, yellowish or slightly purple flowers growing alone on top of the branches. The leaves are tough and linear, the stalks are woody at the base, and the seeds are brown and finely shagreened. The plant seeds itself.

The herb is collected during the flowering season and, for the herbalist trade, dried in sheds. For distilling, it is preferable to use the fresh or, still better, the clover-dried material. *Satureia montana* is seldom cultivated, mostly the wild-growing herb being gathered. Plantings may be started from seed or root divisions.



COST SAVER FOR LIFE SAVERS

Typical of the many varied industries using Wickwire Spencer Metal Conveyor Belts, the Life Saver Corporation finds that they speed production, reduce handling costs and help maintain a high, uniform standard of quality.

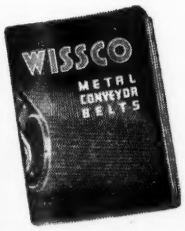
The belts used in the cooling chambers (shown with cover removed) are of stainless steel, 48-53-17 balanced spiral weave construction. The extreme flexibility of these belts permits operation over small pulleys and insures economy of design.

Well recognized for their efficiency in extreme temperature applications, Wickwire Spencer Metal Conveyor Belts are custom-engineered to operate efficiently at –40° F. or at temperatures as high as 2100° F. They can also be especially designed to withstand specific chemical actions, unusual abrasion, or other destructive forces. Wickwire Spencer Belts are fabricated of any metal capable of being drawn into wire; in any length, and in widths from 1" to 192".

Write for our valuable reference book showing types and advantages of numerous conveyor belt constructions. Address Mechanical Specialties Division, Wickwire Spencer Steel Co., Gen'l Sales Office and Plant, Sterling St., Clinton, Mass.

WICKWIRE SPENCER METAL CONVEYOR BELTS ARE BEING USED IN

Annealing Ovens	Chemical Processing	Dehydrating Food	Hardening Furnaces
Baking Ovens	Decorating Glass	Degreasing	Infra-Red Drying
Brazing Furnaces	Ceramics Canning	Frozen Foods	Reclaiming Tin, etc.



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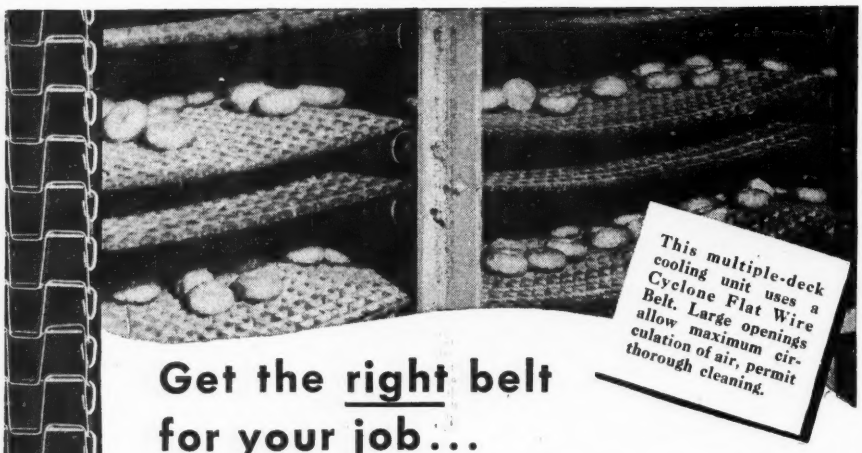
This multiple-deck cooling unit uses a Cyclone Flat Wire Belt. Large openings allow maximum circulation of air, permit thorough cleaning.

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Cyclone's experienced engineers and metallurgists will gladly specify the type of belt—Flat Wire, Chain Link or Flex-Grid—and the metal, alloy or finish best suited to *your* particular operating conditions. And Cyclone's salesmen are ready to give prompt service and cooperation. Cyclone's famous reputation for quality and service, built on 25 years' experience in making metal conveyor belts, is your guarantee of dependability. Offices in principal cities . . . factories in Middle West and on Pacific Coast. Write for free catalog No. 3.

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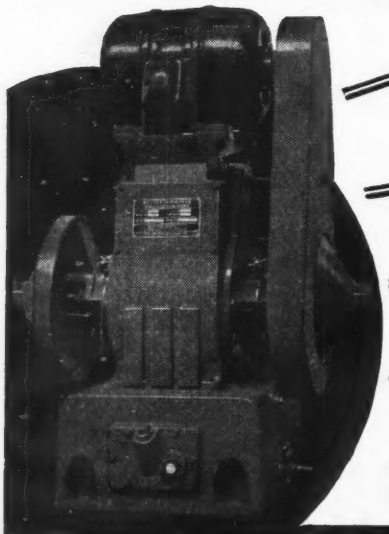
Stokes MICROVAC Pumps

HEART OF HIGH VACUUM SYSTEMS



HIGHER VACUUM in the Low Micron Range

GREATER VOLUMETRIC EFFICIENCY

LOW POWER REQUIREMENT

FIVE SIZES: from 15 to 225 cu. ft. per min.

F. J. STOKES MACHINE CO.
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Stokes *High Vacuum*

PUMPS · GAUGES · EQUIPMENT

The herb is distilled like *Satureia hortensis*, the yield from fresh flowering *Satureia montana* ranging from 0.15 to 0.23 percent.

Gildemeister and Hoffman[2] indicated these properties for oil of *Satureia montana:*

Specific gravity at 15 deg. C. — 0.908 to 0.939
Optical rotation— –1 deg. 42 min. to –4 deg. 48 min.
Phenol content—27.0 to 65.0 percent.
Solubility—soluble in 1.5 parts of 80 percent alcohol

The chemistry of *Satureia montana* oil is similar to that of *Satureia hortensis* oil. Haller,[6] and later Leone and Angelescu,[7] identified the following compounds in oil of *Satureia montana:*

Dipentene—Amounting to about 14 percent of the oil. Nitrolbenzylamine m.p. 108 deg. C.
p-cymene—Amounting to about 27 percent of the oil. Hydroxyisopropyl benzoic acid m.p. 156 to 157 deg. C.
Carvacrol—The main constituent of the oil, which contains 28 to 65 percent phenols. Nitro derivative m.p. 77 to 78 deg. C.
An alcohol (?)—Ten percent of the oil freed from phenols consists of this alcohol, the nature of which was not elucidated. (Ester number after acetylation 54.3.)

Igolen and Sontag,[8] distilled *Satureia montana* L., and obtained the following percentages of volatile oil:

From fresh grass in full bloom....0.333
From dried grass.....0.1477
From 1,000 kilos of grass.....0.100

The oils had these physico-chemical properties, respectively:

	I	II	III
Specific gravity at 15 deg.	0.938	0.914	0.9207
Optical rotation	–1°50′	–2°10′	–3°40′
Refractive index at 20 deg.	1.5065	1.4963	1.4983
Phenol content	56.0%	25.0%	33.0%
Ester number of the nonphenolic fraction	....	....	11.22
Ester number after acetylation of the nonphenolic fraction	....	....	72.95
Ester number of the nonphenolic fraction after cold formylation	....	....	84.17

The oil obtained from the 1,000 kilos of herb material had the following composition:

Phenols (carvacrol, thymol and an unidentified phenol giving a dinitrobenzoate m.p. 93 deg.)....30.40%
Acids (acetic acid and an unidentified solid acid m.p. 56 deg.)..... 0.43%
Ketones (l-carvone, l-menthone).. 0.30%
Alcohols (l-linalool, l-terpineol, d-borneol, dihydrocuminic alcohol) 25.00%
Terpenes (p-cymene) 33.70%

Adulteration

The chemical composition of savory oil resembles that of origanum oil (*Coridothymus capitatus* Rchb. f.), which is produced in large quantities from plants growing wild on the sunny hillsides of southern Spain and Morocco.

Therefore, adulteration of savory oil with that much lower priced oil is tempting, especially in view of the fact that it can hardly be detected by chemical analysis because

Rotogravure

without question . . .

the best way to print

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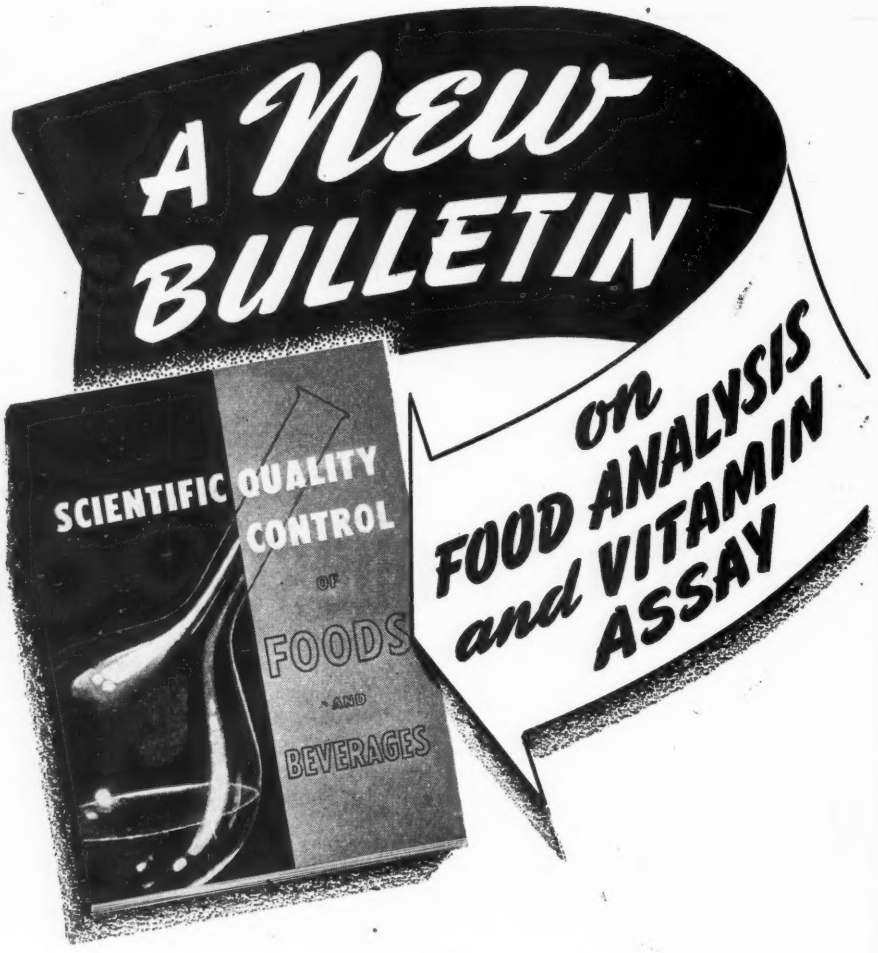


This bulletin explains how processors of foods and beverages can obtain experienced, impartial, *complete* laboratory service to protect the quality and salability of their products.

The illustrations show a range of equipment and facilities which provide for practically every type of chemical and biological test and analysis of materials and products.

The bulletin further explains how the helpfulness of this service is augmented by analytical reports and practical recommendations based on 75 years of specialized experience in serving the food and beverage industries.

Also included in the bulletin are some significant case studies: one, showing how claims for a new product were substantiated; another, describing how a court release was obtained for a valuable shipment; and a third, explaining how a serious threat to a long-established reputation was removed . . . all by skilled laboratory analysis and equally skilled interpretation of results.

Every food and beverage plant executive will find much of interest in this new bulletin . . . your copy sent on request.

Schwarz

202 EAST 44th ST.
NEW YORK 17, N. Y.

LABORATORIES, INC.

the constants of savory and origanum oils are similar. An expert familiar with the delicate and characteristic odor and flavor of genuine savory oil will have little difficulty recognizing sophistication with origanum oil which possesses a coarse, phenol-like character. This is also true if the oil has been adulterated with synthetic carvacrol.

Occasionally thyme oil (*Thymus vulgaris* L.) is used for the adulteration of savory oil, both oils possessing similar properties. However, thyme oil contains as main constituent thymol, a crystallizable phenol which can be separated by congealing, while savory oil contains as main constituent carvacrol, a noncrystallizable phenol.

References

1. Private communication.
2. *Die Ätherischen Öle*, 3rd Ed., vol. III, 722-3.
3. *Revista italiana essenze profumi*, vol. 7, 16, 1925.
4. *Bericht der Schimmel & Co.*, 1932, p. 7.
5. *Berichte der deutschen chemischen Gesellschaft*, vol. 15, 816, 1882.
6. *Comptes rendus*, vol. 94, 132, 1882.
7. *Gazzetta chimica italiana*, vol. 51, II, 368, 1921.
8. *Revue des marques de la perfumerie et de la savonnerie*, vol. 17, 109, 1939.

—End—

New Food Ships

(*Continued from page* 102)

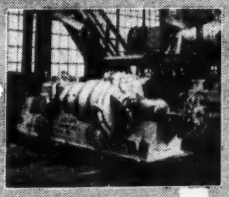
and *T* and *G* lining was usual practice. But because of the demonstrated difficulty in controlling ship fires where loose cork is used, that type of construction has been justifiably outlawed.

The requirements of the ideal insulator for shipboard use are many and uncompromising. It must have high insulating value to conserve the costly volume of a ship's enclosure and to minimize power demands. It must be light in weight to conserve deadweight capacities of the vessel. It must of necessity be flexible and resilient to accommodate the flexing of the steel vessel in a seaway without opening joints. At the same time it must have good structural strength to support floor loads or the impact of moving cargo. A good ship insulator must resist disintegration or deterioration in such severe usage. The greatest destroyer of ship insulation is moisture, the source of which is infiltrating air and tramp water from ice-packed cargo or defrosting coils. So the insulation must be moisture resistant in element and interstices, which requires that it be impervious to infiltrating air. When it meets these requirements, it may well be expected to be permanently odorless,

GLASSINE and GREASEPROOF

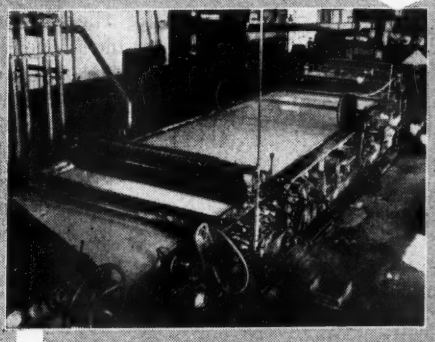
HOW IT IS MADE. WHY IT IS SO WIDELY USED IN PROTECTIVE PACKAGING.

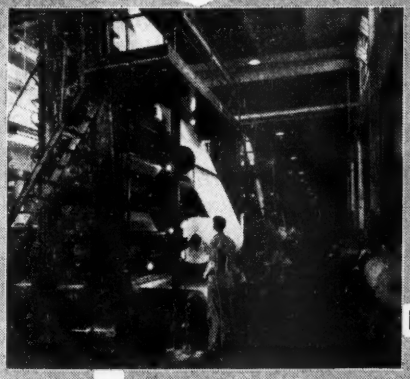
PULP—Only a few special pulps can be used in making glassine and greaseproof.



REFINING—Special refining equipment is needed to properly prepare the pulp for the paper machine.

PAPER MACHINE—Fourdrinier machines are required, and must be run very slowly to provide proper formation and drying. As the paper leaves the machine it is *opaque* greaseproof.





SUPER-CALENDER—The *opaque* greaseproof becomes *transparent* glassine through a special super-calendering operation. No other treatment is required.

"Glassine and Greaseproof" is the common trade designation for a vast group of protective packaging papers, unlike all other forms of paper due to certain basic manufacturing differences. The technical qualities of Glassine and Greaseproof can be varied in many ways on the paper machine or by later finishing and converting operations. This enables us to "tailor-make" our papers to your individual requirements—efficiently and economically—an accomplishment that has made Riegel's Glassine and Greaseproof among the most widely used of all packaging materials.

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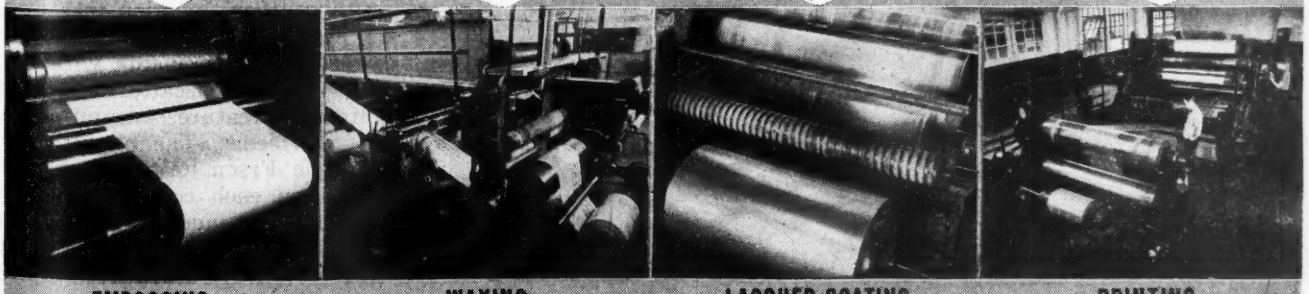


EMBOSSING **WAXING** **LACQUER-COATING** **PRINTING**

There are many ways in which we can finish or convert glassine and greaseproof to give it the exact qualities you require—continuous or spot-printing, embossing, lacquer-coating, laminating, inter-folding, inter-leaving, and so on.

In the last Analysis

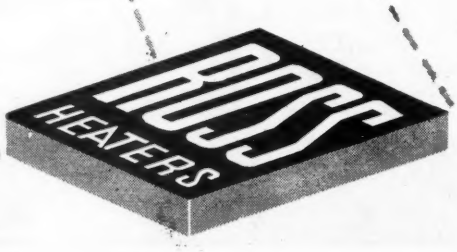
...sturdiness, operating efficiency and economy are your foremost interests in heating equipment. There you have the basic principles determining the design and construction of Ross Heaters.

Simple design and sturdy construction of durable materials...Highest heat transfer with lowest pressure loss through arrangement of baffling...Permanent tube joints roller expanded...No internal gaskets to leak...Tubes accessible for easy inspection and quick cleaning...Conservative capacity ratings to assure constant, trouble-free service ...Easily installed through provisions for mounting in any position and to meet any piping layout.

Ross has a real story to tell on heating equipment. Either of these two bulletins will sum it up for you quickly. Then, have a Ross heat exchange engineer go over your individual problems with you.

BULLETIN 3624-A: Straight Tube Heaters and Preheaters for fuel oils and other heavy fluids. Tank Suction Heaters for heavy viscous fluids.

BULLETIN 3623-A: Closed Type Feed Water Heaters. Service Water Heaters. Hot Water Converters. Process Heaters.



ROSS HEATER & MFG. CO., Inc.

Division of American Radiator & Standard Sanitary corporation

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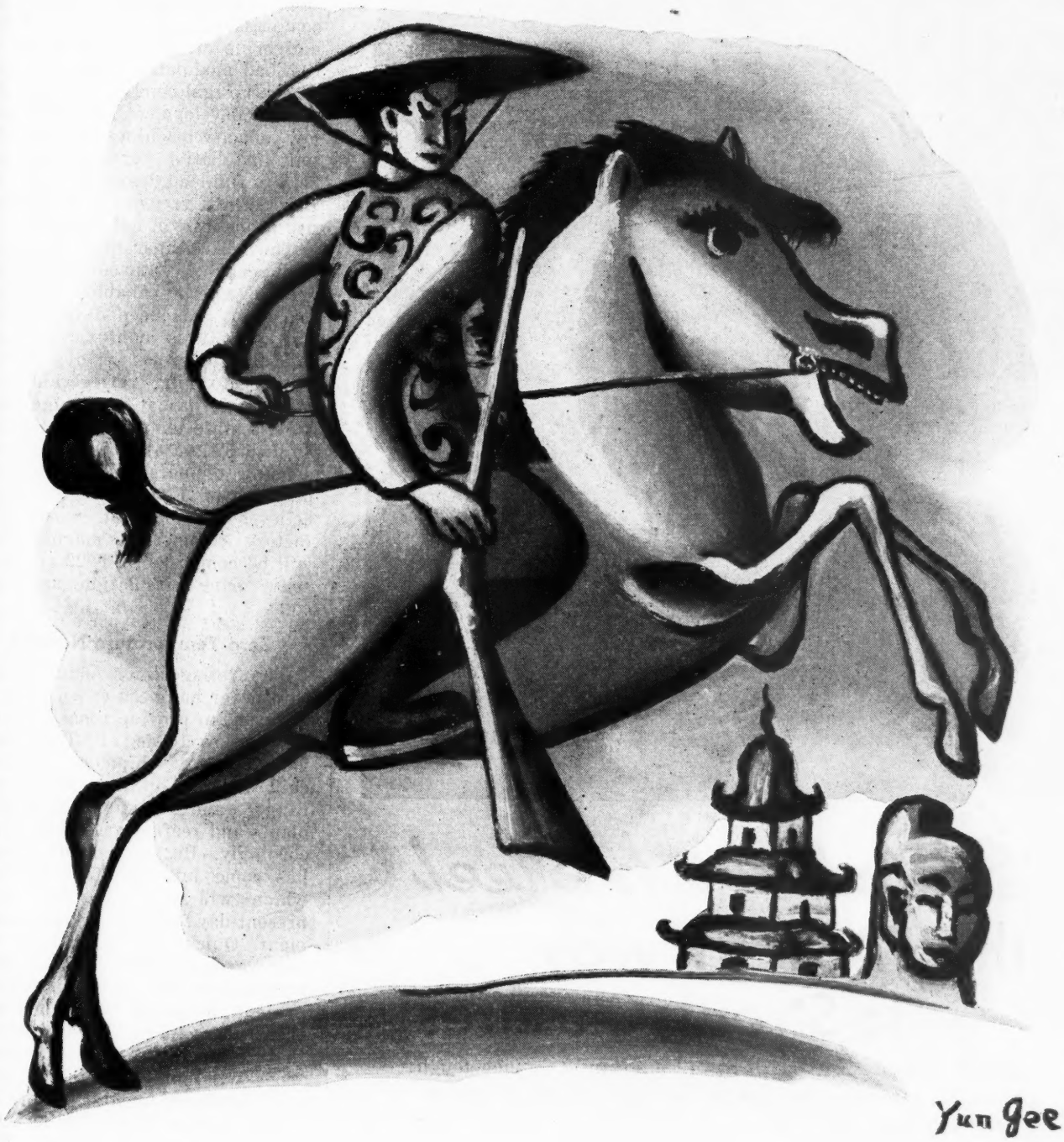
and will not harbor vermin or rodents. To meet the new regulations, the insulator will have fire resistant qualities and it should be workable in construction and reasonable in installed cost. There have been countless efforts to produce insulators that will meet the many and peculiar requirements for marine installations, but it is the author's opinion that corkboard most nearly meets these requirements. He advocates a type of construction that he has demonstrated successfully, using only steel bulkheads, corkboard laid up in waterproof adhesive cement and Transite inner sheathing similarly secured.

A completed reefer is fitted with floor gratings to permit air movement through the cargo, a recirculating air system discharging over the coils, a panel-type wall-coil baffle and recording and electric recording and electric resistance thermometers.

The refrigerating systems serving these rooms have seen considerable development—and in some wartime cases, overdevelopment. With the admitted toxic hazards of ammonia on vessels subject to war damage and the limitations of carbon dioxide systems in sea water temperatures that may equal this refrigerant's critical temperature, Freon (F-12) has for the moment come to the forefront.

The Refrigerants Used

Freon, as is well known, is nontoxic, has at zero gage pressure a state temperature of –21 deg. F. and at a condensing temperature of 90 deg. F., a state pressure of 100 p.s.i. The compressor displacement per ton of refrigeration with F-12 is relatively high, the objections being more than canceled through the development of multicylinder compressors of speeds well over 1,000 r.p.m. It has been an excellent refrigerant for ships' stores and small plants. While we have seen that in wartime "nothing is impossible" in cost or complicity, it is the author's opinion that Freon is not suitable for large marine direct-expansion plants with their many circuits, scattered controls, automatic features and oil-circulation problems. The paralleling of multiple Freon units is not desirable, and each compressor should operate independently with its own condenser, receiver and evaporator. Further, with future low-temperature demands, a Freon compressor will have to operate at a pressure considerably less than atmospheric and into a zone where purging troubles begin.



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Acme Silverstitchers are power driven machines that form staples from continuous long length coils of steel wire . . . Silverstitch Stapling Wire. Silverstitchers have few moving parts . . . vital parts reversible for long service. The result: *Years of top performance* through simplicity of operation.

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ALSO MANUFACTURERS OF ACME STEELSTRAP AND STRAP APPLYING EQUIPMENT

Several all-insulated ship installations have employed centrifugal compressors using Carrene (F-11) and brine circulation. But due to the load modulation characteristics of centrifugal compressors and the limited development of commercial low-capacity machines for multiple-unit installation, together with the zero to full-load demands of marine refrigerated transport, its general use probably will not be seen.

The new refrigerant, F-22, should find ready acceptance for marine service when available and when machinery has been developed for its use. It is nontoxic and approaches the properties of our truly best performing refrigerant, ammonia. It has at zero gage pressure, a state temperature of minus 40 deg. F. and at a 90-deg. F. condensing temperature has a state pressure of 170 p.s.i. The writer believes the simplest, most satisfactory commercial marine plant will be composed of F-22 compressors, brine circulation and wall coils.

Zero Temperature Needed

The refrigeration plant aboard ship never has been called upon, in the past, to provide room temperatures below 10 deg. F. The principle volume of shipment has been chill cargoes in the 34-40 deg. range, and most refrigerating plants and reefers are designed accordingly. But an extreme change has come into our food industry which will make obsolete every present-day marine refrigeration plant. Quick frozen products will require an unwavering shipping temperature of 0 deg. F., and our present insulated space and machinery are incapable of providing that temperature. Quick frozen foods will not completely displace chill cargo shipments, but we can expect them to be the dominant factor governing our designs. With the variables of demand and source, it is good planning to design all reefers to be convertible so as to serve at any range from 0 to 55 deg. F.

High Quality Essential

The history of refrigerated cargo, previous to stowage in the ship's reefers, has a most important bearing upon the successful delivery at the offshore market. Pride of product and the hope of successful sales promotion are factors that will demand the selection for export of only prime grades of stock at the source. Where variables in keeping qualities of spe-

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Have you a new product? Is it in powdered, granular, pebble, crystal or lump form? Does it require protection against moisture loss or absorption . . . loss of aroma or absorption of odors . . . dirt, sifting or contamination?

If you have a product like this, the Bemis Waterproof Bag is probably the ideal container. For years Bemis Waterproof Bags have provided manufacturers of many diversified products with these cost-saving advantages:

- *Bemis Waterproof Bags cost less than other containers that give the same protection.*
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- *The light weight of Bemis Waterproof Bags means economies in shipping costs.*

Investigate the possibilities of Bemis Waterproof Bags as containers for your company's new "baby." Mail coupon below for interesting booklet, "A Guide to More Efficient Shipping."

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Copies of the Prospectus may be obtained from the undersigned.

A. G. Becker & Co.

Incorporated

July 10, 1945

cies or source exist, only those that excel should be shipped to distant markets.

The finest raw material, perfectly processed, carefully handled and packed, has other hurdles to take before reaching the quiet cold of a ship's reefers. Careless handling by warehousemen, and truckers, damage by jarring and vibration in truck or car, can result in mechanical damage that can shorten the life span of the best product. Exposure to the sun, or rain and to temperature extremes can also accelerate enzymic action, and be conducive to the development of factors that make for short marketing life. In the case of quick frozen foods, it seems there is here and unsolved problem and a challenge to the railways and truckers.

Food that is transferred from cold storage or is precooled must be brought to the ship's side so packed and so handled that the product cannot be moistened by "sweating" or be subject to exposure to warm air and the sun's heat. Frozen meats should have particular consideration and expeditious handling.

We can expect postwar improvements and developments in shipside facilities and in terminal operations. They will be influenced no little from our wartime operations, such as that of supplying our distant armed forces with perishable foodstuffs.

—End—

Retort Output and Steam Capacity

(*Continued from page* 89)

4. Heating the food product:
   $W_4 = 1{,}068$ at $1.1 = 1{,}175$ lb.
   $c_{v4} = 0.82$
   $t_{i4} = 105°F.$
   $Q_4 = W_4 \times c_{v4} \times (t_s - t_{i4}) = 1{,}175 \times 0.82 \times (240 - 105) = 130{,}000$ B.t.u.
5. Heat loss by radiation and convection:
   $S = 85$ sq. ft.
   $k' = 0.04$ B.t.u. sq. ft./ min./°F.
   $N' = 15$ min.
   $t_a = 68°F.$
   $Q_5 = S \times k' \times N' \times (t_s - t_a) = 85 \times 0.04 \times 15 \times (240 - 68) = 8{,}800$ B.t.u.
6. Heat loss through bleeding:
   $\sum_1^5 Q = 40{,}600 + 10{,}900 + 4{,}600 + 130{,}000 + 8{,}800 = 194{,}900$ B.t.u.
   Approximate method:
   $Q_6 = 0.05 \sum_1^5 Q = 0.05 \times 194{,}900 = 9{,}750$ B.t.u.

Merchandising Tips-No. 3

How to win your share of this profitable "no man's land"

Every careful market analysis reveals a broad strip of "impulse" sales between your share of business and competition's share. The best way to clinch this profitable business is to let your product *sell itself* in a clear, clean Anchorglass package!

Sight of the product stimulates the shopper—invites use—and so creates desire. Even where visual appeal may not be a factor, shoppers know that glass is most honest, most sanitary, most convenient.

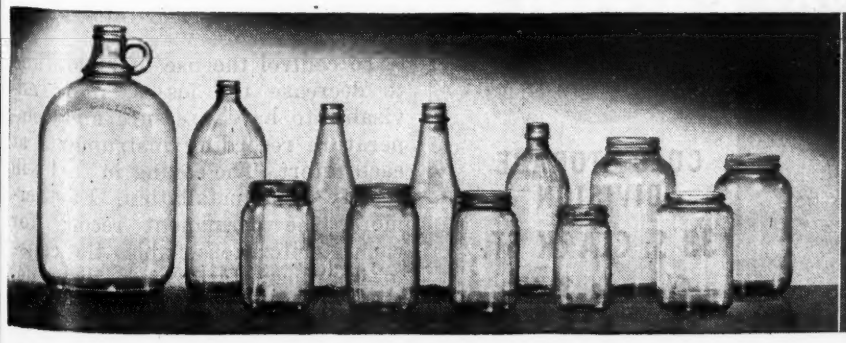
Add the fact that Anchorglass Containers and Anchor Caps are fast handling in production, and you have the perfect postwar package. There's an Anchor Container and Closure to keep *your* product fresh and convenient to use 'till the last bit is gone.

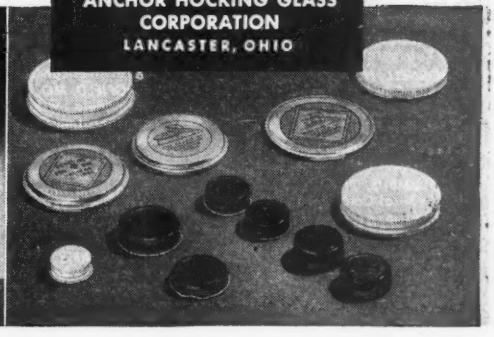
CBS

Hear how Anchor Hocking is educating millions of your customers and retailers every week to the advantages of modern glass packaging—"Meet Corliss Archer" every Thursday evening, entire Coast-to-Coast Network, CBS.

Anchor
CONTAINERS and CAPS

PRODUCTS OF
ANCHOR HOCKING GLASS CORPORATION
LANCASTER, OHIO





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THE DELICIOUS FRESH FLAVOR
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Expert, economical handling and proper storage of frozen foods and meats a specialty in each of the 14 warehouses. Their facilities are at your service now.

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COLD STORAGE WAREHOUSES

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COLD STORAGE DIVISION
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Exact method:

Number of bleeders 2; diam., ⅛ in.

Area, $A = 2 \times 0.012$ sq. in. $= 0.024$ sq. in.

Pressure, $p = 22$ p.s.i.; $p^{0.97} = 20$

$W_6 = A \times p^{0.97} \times N' = 0.024 \times 20 \times 15 = 7.2$ lb.

N' = time of bleeding = 15 min.

$Q_6 = 7.2$ lb. at 1,168 B.t.u./lb. = 8,400 B.t.u.

The assumption of 5 percent is conservative.

Heating demand during the "heating" cycle:

$$Q_H = \sum_1^6 Q = 194{,}900 + 9{,}750 = 204{,}650 \text{ B.t.u.}$$

$$W_H = \frac{Q_H}{s_g - s_f} = \frac{204{,}650}{988} = 207 \text{ lb./15 min.}$$

Since this steam is used in 15 minutes, the hourly steam requirement for the heating cycle is.

$$\frac{207 \times 60}{15} = 828 \text{ lb./hr.}$$

II. Sterilization cycle:

7. Heat loss by radition:

$N'' = 50$ min.

$Q_7 = S \times k' \times N'' (t_s - t_a) = 85 \times 0.04 \times 50 \times (240 - 68) = 29{,}300$ B.t.u.

8. Heat loss through bleeding:

$W_8 = A \times p^{0.97} \times N'' = 0.024 \times 20 \times 50 = 24$ lb.

$Q_8 = 24$ lb. at 1,168 B.t.u./105 min. $= 28{,}000$ B.t.u.

Heating demand during the "Sterilization" cycle:

$Q_8 = 29{,}300 + 28{,}000 = 57{,}300$ B.t.u.

$$W_8 = \frac{57{,}300}{988} = 58 \text{ lb.}$$

Hourly steam requirement:

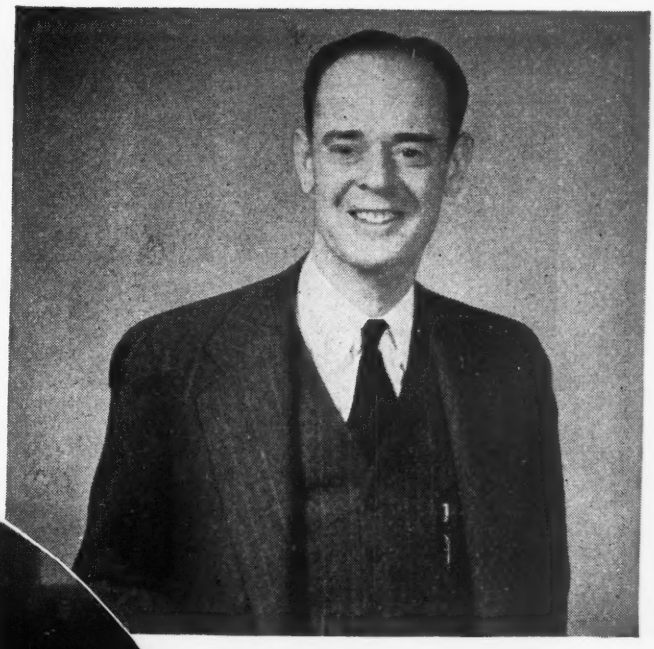
$$\frac{58 \times 60}{50} = 69.5 \text{ lb./hr.}$$

Total demand for both cycles: $828 + 69.5 = 897.5$ lb.; say, 900 lb. or 30-hp. boiler capacity.

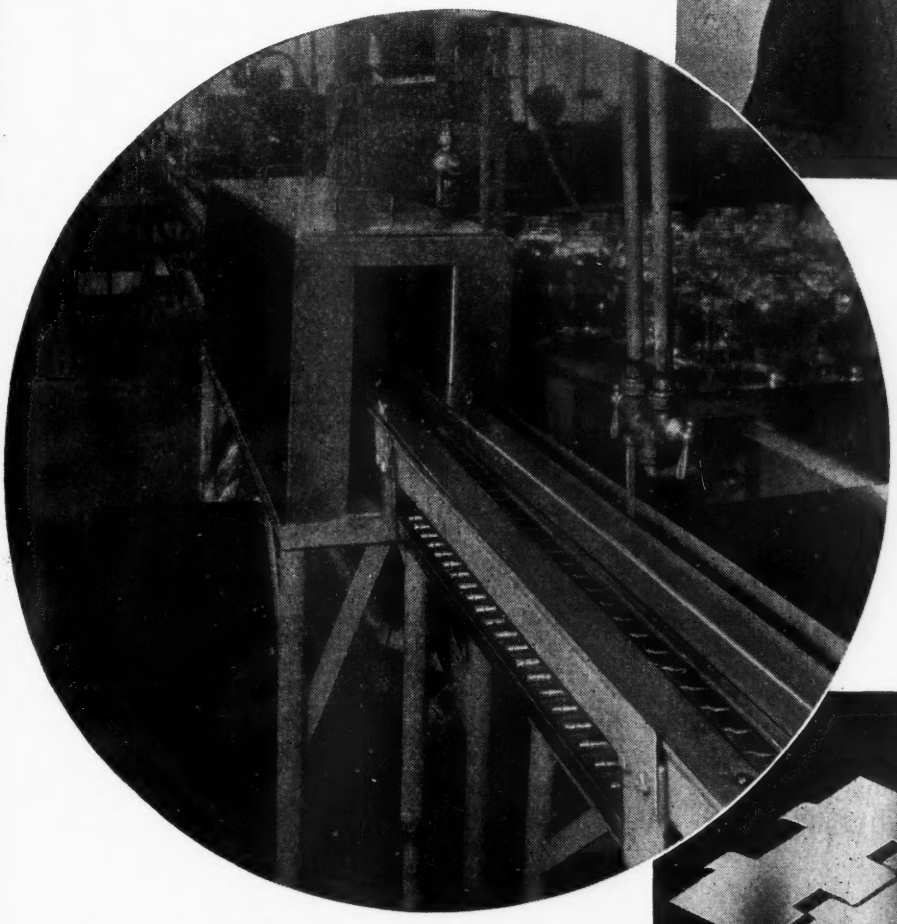
The preceding computation did not consider the heat loss in the distribution system from the steam generator to the sterilizing retort, nor losses due to friction, bends, valves, pressure regulators, nor losses from improper operation of the retort. These losses will vary for each plant since they depend on the layout of the piping system and on the skill of the operator at the retort.

To control the use of steam and to decrease the losses, it is advisable to have pressure and temperature recording instruments at each retort. The saving in fuel will justify such installation. Furthermore, the permanent record for each sterilization enables the cause of improper sterilization to be determined. With the present short-

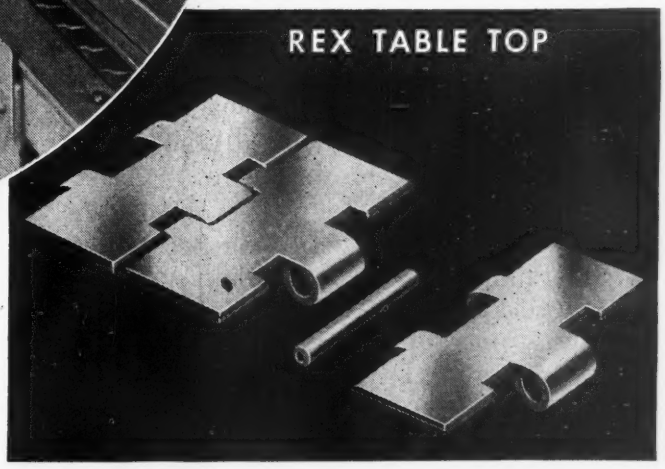
We took the JARS out of Jar Conveyors!



① BREAKAGE AND SPILLAGE headaches have been cured by the chain belt conveyor that travels as smoothly as a table top . . . Rex Table Top. Jerky, bumpy conveyors that jarred and broke containers are a thing of the past.



② FOR EXAMPLE, the jars that ride on this Rex Table Top conveyor chain glide smoothly along, never jamming, never hesitating, never breaking or spilling. Perfectly flat, with bevel-edged links, Table Top never catches or "trips" containers at transfer points . . . slides freely from under blocked containers, preventing pile-ups, spillage and breakage.



③ SIMPLE DESIGN IS THE SECRET of Table Top's success. It's a one-piece platform link with a simple pin connection. Fewer parts mean less chance for chain trouble, greater steadiness. There are no attachments to break loose or "wobble." It stays cleaner! There are no pockets to catch and hold dirt. Driving sprockets engage the full width of the hinged joint for smooth action, greater bearing area, and long life.

* * *

Rex Table Top is the answer to any problem involving the conveying of bottles, jars or cans. The Rex Man will help you with your chain belt application problems. For complete information on Rex Table Top, write for your copy of Bulletin No. 464. Chain Belt Company, 1616 West Bruce Street, Milwaukee 4, Wisconsin.

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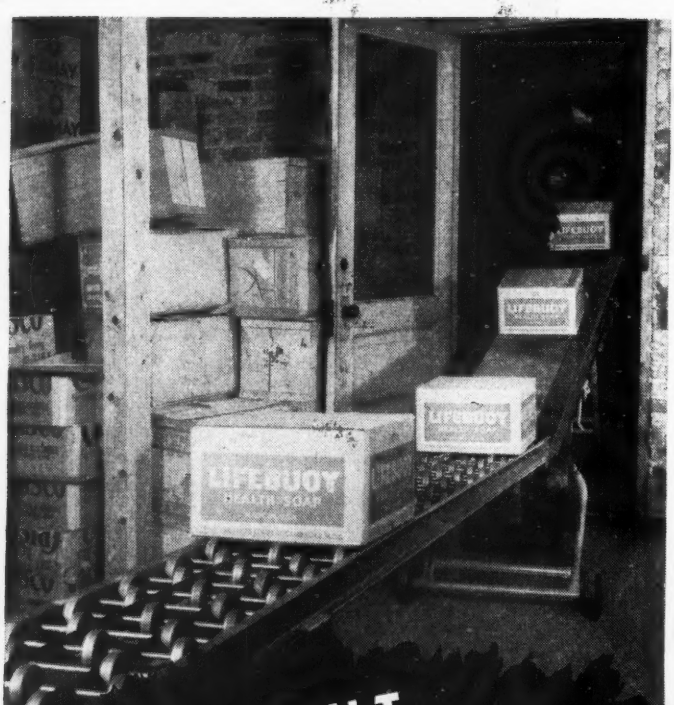

THE RIGHT COMBINATION FOR *Faster Handling*

Your requirements for faster handling of packaged materials can be met with the right combination . . . Rapid-Wheel Portable Gravity Conveyor and the Stevedore, Jr.

Each section of Rapid-Wheel Conveyor is a self-contained unit, adjustable from a minimum 6″ to a maximum 50″ operating height. . . . (Cam-Lock standards — same as used on Stevedore, Jr.) Sections are easily coupled together with self-locking coupler. Reversible curve sections and adjustable guard rails are standard accessories.

Rapid-Wheel Gravity Conveyor furnishes the power downgrade, while Stevedore, Jr. Power-Belt Conveyor saves man-hour-handling time in loading, unloading, stacking and elevating operations. Quick-acting "Cam-Lock" standards on the Stevedore, Jr. provide a range of adjustments to meet varied operating conditions — from 18″ level to delivery height of 72″. The Stevedore, Jr. plugs in standard 110 volt lighting circuit and lifts a 225-pound distributed load at the rate of 50′ per minute.

Write us about your handling problems and get facts on how you can save time and money.

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The Rapids-Standard Co., Inc.

Sales Division—361 Peoples National Bank Building, Grand Rapids 2, Michigan

age of solid and liquid fuels, the saving of steam per sterilization might permit more sterilizations with the same fuel quota.

Reference

1. P. Songefest and H. A. Benjamin, Heating Lag in Thermal Death-Time Cans and Tubes, *Food Research*, No. 3, 234-43, 1944.

—End—

Carbon Dioxide

(*Continued from page* 86)

must be removed before liquefying. To accomplish this, there are two processes most widely in use. In one, activated carbon is the base absorbent, while in the other only chemicals are used.

Backus Process[1]—This process is shown in Fig. 5. The CO_2 from the fermenter is collected in a gasometer and then passes through Feld scrubbers, where the ascending gas flows countercurrent to the scrubbing liquid. The washed gas is forced through activated-carbon purifiers. These are cylindrical vessels and connected in series. Usually two units are installed. They are provided with U-shaped tubes and the activated carbon packed between the tubes. After the carbon's deodorizing activity is decreased to a certain point, it must be revivified. Therefore, while one unit is in use, the other is revivified by circulating high-pressure steam through the tubes.

Activated carbon is a very efficient deodorizer; it has added advantages when used in combination with chemicals.[3]

Reich Process[4]—In this process, the purification of the fermentation gas consists of dealcoholizing the gas by scrubbing it with a weak alcohol solution, collecting the gas in a gasometer and compressing the gas to 75-100 lb. pressure. It is now deodorized with a hexavalent chromium compound and is dehydrated with sulphuric acid. The oxidation products and entrained dehydration agents are removed by means of charcoal, alkaline compounds and oil. Figure 6 shows a general plant setup for this process.

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6. *Ibid.*, Alkali Slurry for CO_2 Recovery, *Chemical and Metallurgical Engineering*, March, 1940.